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[ILLUSTRATED.]

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The Immisch Motor.

We have received from Mr. Albion T. Snell, the electrician to Mr. Immisch, a few particulars respecting the construction of the electro-motor, to which we alluded in our last issue. We have commented upon the apparatus somewhat freely in our other columns, and we shall therefore now deal only with the technical details of the motor, which appears to possess features likely to bring it into considerable favor. Fig. 1 shows a view of a 6 horse-power motor, the coiling of the armature is shown diagrammatically in Fig. 2, and the commutator in Fig. 3. In the diagram only 8 coils are indicated, although 48, 96, or more may be employed. The commutator is of the bisected type, and the coils are joined to two adjacent segments of the commutator on the two rings, of which one has an angular advance equal to one-half the width of the commutator bar. The two brushes side by side upon the two rings are connected together, so that only one pair is shown in the figure. Starting from one ring of the commutator under the brush, say with the coil marked 1, we cross to the other side of the armature, and join the connection leading to coil 6; but if we follow this line backward to the commutator we arrive at a segment under the same brush from which we started. Similarly, coil 5 connects with coil 2, and is short-circuited in the same way by the other brush. It will be observed that the magnetic axis of the armature itself would be situated underneath the coils which are short-circuited. The remaining connections are easy to follow; the two halves of the circuit can be traced through coils 6, 3, and 4 in series upon the one side, and coils 8, 7, 2 in series upon the other. It is to be observed, however, that this arrangement only amounts to the same as having an armature of normal type with a brush of wide face, so that its contact with two adjacent commutator bars is considerably prolonged.

It was thought probable when the first experiments were made that difficulties might be experienced from the heating of the coils during the period of short-circuiting which occurs twice in every revolution. No such effect has practically been found to occur so long as the field poles are properly proportioned, and in the case of a motor the brushes may even be shifted some distance to either side of their normal position without producing either sparking or any perceptible increase of heating. But, curiously enough, this does not apply to a dynamo of similar construction, the position of the brushes having to be adjusted with some care. So long as this is attended to the machine runs with perfect smoothness; but as soon as the brushes are displaced, although little or no sparking taking place, yet considerable and rapid heating is the result. It is claimed, however, that this is of little practical importance, for when the position of the brushes has once been determined they can be rigidly fixed, and the dynamo requires no further adjustment, whether running on open circuit or with full load. It is said that the non-heating of the coil proves that during this part of the revolution the algebraical sum of the number of lines of force passing through it is constant. Mr. Albion T. Snell thus explains the discrepancy between the action of dynamos and motors in this respect upon the supposition that the angular distance upon the armature core over which no lines of force either enter or leave the iron is greater in the case of a motor than in that of a dynamo of similar construction.

Fig. 4 is a sketch showing the armature in section. *S* is a sleeve keyed or feathered on the axle, *A*; *I I* are the iron discs or washers insulated from each other, of which the armature is built up; and *D D* are larger discs with projecting teeth, as in the Pacinotti ring, which serve as guides in coiling the wires, or, as Mr. Snell prefers to call them, driving horns. We may here mention that an armature coiled in the Immisch manner and then in the method devised by Siemens gave, under similar conditions, results in favor of the former, the efficiency being somewhat higher and the sparking less.

Mr. Snell has also experienced similar effects with the Immisch apparatus to those observed by Mr. Esson and chronicled in our last issue.

The motor can be run in either direction by simply reversing the connections of either field magnet or armature connections, but this feature is common to the Reckenzaun and Elwell-Parker types also.

We have given a somewhat brief outline of the Immisch motor—the same maker's dynamo having a precisely similar armature—but in a future issue we may have occasion to refer to it again, for there are several features of interest in the application of these motors to tramway purposes which we hope shortly to describe, a 40 horse-power machine now being in course of construction for electric locomotion. We append a table of tests with which we have been favored, showing the excellent results obtained in a trial of two motors.

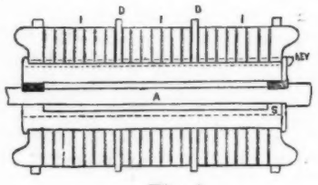

Fig. 4.

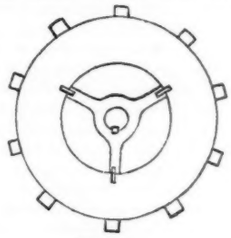

Fig. 5.

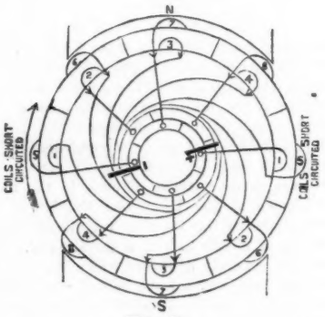

Fig. 2.

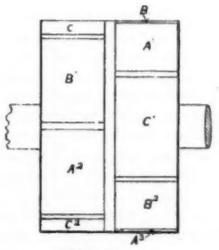

Fig. 3.

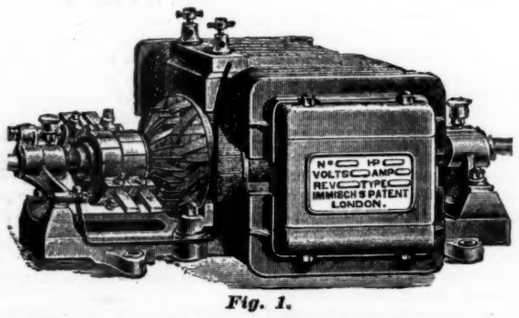

Fig. 1.

The following trial, taken at random from the test-book, refers to a S.M.4. motor:

Internal resistance, 0.25 ohm.

Speed.	Weight.	Volts.	Amperes.	H.P.	E.H.P.	Efficiency.
1980	7	53.5	27.25	1.385	1.96	.705
1780	7	48.5	27	1.25	1.76	.705
1400	7	40	25.5	.98	1.37	.71
1800	8	52.5	28.75	1.44	2.04	.705
2200	8	63	29.5	1.76	2.48	.705
1450	8	42.5	28.5	1.16	1.62	.715
1740	8	51	28.5	1.4	1.95	.72
1900	8	54	29	1.52	2.01	.72

Average efficiency, 71 per cent.

Test of a S.M.6. Motor.

920	12	130	31.25	4.42	5.45	.81
980	12	134	31.5	4.7	56.8	.83
1080	12	147	31	5.2	6.1	.85
1080	12	147.5	31.5	5.2	6.2	.835
960	12	137	31	4.6	5.7	.806
990	12	131	31.5	4.8	5.55	.865
1000	12	148	31	5.2	6.15	.845
1060	12	152	31.5	5.25	6.4	.82

Average efficiency, 85 per cent.

—*London Electrical Review.*

The French Exhibition of 1889.

Electricity and its applications will be comprised in Class 62 in the general classification of the Paris Exhibition of 1889, and will be arranged as follows: 1. The production of electricity, static electricity, batteries and general apparatus. 2. Magneto and dynamo-electrical machines, accumulators, transmission of electricity, cables and other conductors with accessories, lightning conductors. 3. Electrometry, measuring apparatus, electrical counters. 4. Applications of electricity, telegraphy, signals, telephony, microphony, photophony, the electric light, electric motors, electric locomotion, transmission and distribution of power, transformers. 5. Medical electricity, electro-chemistry. 6. Magnets and electro magnets, compasses, electric clocks, miscellaneous apparatus. On the 17th of October, M. Lockroy, Minister of Commerce and Industry, nominated a double committee to preside over this class. The first consists of forty members, and comprises such well-known names as Becquerel, Marcel Deprez, Mascart, Carpentier, Fontaine, Joubert, Lemonnier, Menier, Mercadier, De Meritens, Planté, Richard, Vivarez, L. Weiller, etc. The second is composed of twenty-nine members, and includes MM. Barba, Bourgault, Debroze, Delaunay, Duval, Farcot, Krebs, Laurens, Richard, Tissandier, etc. The first committee will preside over strictly electrical matters, and the second will take charge of machines and practical applications.

How Lightning is Kindled.

The observations of meteorologists show that the vapor which ascends in an invisible shape from the ground carries with it, in calm and fine weather, into the region of the air, a very considerable supply of positive electricity. Each minute vapor particle that goes up bears its own portion of the load. When, however, the invisible vapor has thus mounted into very high regions of the air, it loses its invisibility, and is condensed into visible mist. Numerous particles of the aqueous substance are drawn close together, and grouped into the form of little vesicles or globules. Each one of these is then a reservoir or receptacle of electric force, and as more and more watery vesicles are condensed, more and more electricity is collected in the gathering mist; but each of the water globules is still enveloped by a space of clear air.

In a drifting cloud the mist specks can be discerned floating along with transparent intervals between. The clear air which lies around the globules of vapor then acts as an insulating investment; it imprisons its own part of the acquired electrical force in each separate globule. The cloud is thus not charged as a whole, like a continuous mass of metal, with its electricity spread upon its

outer surface. It is interpenetrated everywhere with the force. It is composed of a myriad of electrified specks, each having its own particular share of the electric force, and each acting as a center of electrical energy on its own account. The electricity which at any one instant resides in the outer surface of a cloud is, therefore, but a comparatively small portion of that which is present in the entire vaporous mass.

That such is the way in which electricity is stored in the clouds has been proven by direct observation. When a gold-leaf electrometer is placed in the midst of a cloud driven along by the wind, it is seen that the strips of gold-leaf continually diverge and collapse as the mass of the cloud passes along. There is an electrical charge acting in all parts, but the charge varies in intensity from place to place, accordingly as there is a greater or less condensation of the particles of vapor in each particular spot. But the influence externally exerted by the cloud is nevertheless capable of being raised to a very intense degree, because it is, so to speak, the sum total or outcome of the forces contained in the innumerable internal centers of energy.

It is no uncommon thing for the electrical force emanating from a cloud to make itself felt in attractions and repulsions many miles away. Clouds resting upon the remote horizon thus frequently produce perceptible effects at distances from which the clouds themselves cannot be seen. An electrical cloud hanging a mile above the ground acts inductively upon the ground with considerable power. When in summer time the temperature of the earth's surface is very high, the ground moist, the air calm and sky clear, very copious supplies of vapor are steamed up from the ground under the hot sunshine.

Clouds, however, begin at length to gather in elevated regions of the air out of the abundance of the supply. The free electricity which has been carried up with the vapor is at first pretty evenly spread through the clouds; but after a time, as the electrical charge becomes more and more intense, a powerful repulsive force is in the end established between the spherules of the mist, and a very high degree of tension is at last produced at the outer surface of the cloud, where it is enveloped by insulating air, until in the end the expansive energy there becomes strong enough to occasion an outburst from the cloud. The escape of the redundant charge then appears to an observer's eye as a flash of lightning issuing from the cloud. Such, in its simplest form, is the way in which lightning is kindled in the storm cloud.

The Immisch Motor.

There is no doubt that Mr. Immisch has acted with great wisdom and prudence in refraining from bringing his electro-motors prominently before the electrical world until he was fully satisfied as to their ability to perform their functions satisfactorily. Many a promising invention has been injured by a too hasty plunge into the cold waters of practical application, when a little unpreparedness, or a failure arising from some trivial but unforeseen circumstance, has often been the means of unjustly discrediting it, and perhaps altogether preventing its adoption.

From a description which we publish on another page, it will be seen that the Immisch motor has been modified during the past year or two, until some objectionable features which it possessed at the time of the Inventions Exhibition have, in the opinion of its inventor, been removed. We hope these motors may be able to endure the struggle for their existence, and may prove their fitness by their survival. We venture to think, however, that in that struggle they will be still further modified, and will probably eventually settle down into some simple form of the drum-armature type, with collectors of the Gramme pattern. It may be said even now that they differ in no respect except in their method of connection and commutation from the above-named type; and this is an additional proof, to the many which have been afforded in the process of settling down of types during the last few years, of the wisdom of those who have found that variations from certain simple and well-defined forms were seldom productive of substantial benefit.

In form the armature is of the drum type, and like most other drum-armatures is composed of a number of thin disks or washers strung on the shaft, and insulated from one another. At the ends of the drum, and for a short distance also in the middle, the disks are provided with Pacinotti teeth or projections, which are no doubt useful as guides in winding, and as supports for the coils when wound.

Unless we are mistaken, the motor shown at the Inventions Exhibition was provided with teeth along its whole length. We suppose it has been found that they could be dispensed with without loss. Whether there is any real advantage in the use of such projections from an electrical or magnetic point of view may be doubted. The question has from time to time been the subject of discussion amongst efectricians, in our columns and elsewhere, without any final or conclusive decision being arrived at. There is no doubt that, as such projections may be brought very near to the pole pieces, the magnetic resistance of the air space may, under some circumstances, be thereby reduced, and this is an advantage. But if the main body of the armature core is to be worked at a high degree of saturation, as is desirable, it follows that these projections should be very large, or they will be themselves saturated long before the mass from which they spring, thus leaving those lines of force which they cannot convey to find their way into the core by the rather deep and highly resisting paths through the depressions in which the winding is placed. To meet this difficulty, then, the projections, to be really useful, should offer a considerable surface to the poles and have a large total section. But if this is done the space left for the wire becomes unduly limited, and relief can only be sought by increasing the current density, which is objectionable on more grounds than one; or by increasing the size of the armature, which means increased cost. A further objection to these teeth is that they favor the formation of moving tufts of lines of force which may cause loss of energy by Foucault currents, but this loss can be greatly reduced or perhaps practically eliminated by making the number of projections considerable, and thereby subdividing the tufts until a smooth and even action, without jerks or pulsations, is obtained. Another consideration in connection with these Pacinotti projections may be brought forward, as it to some extent springs from the objection last alluded to, viz., that they give rise to buzzing, or pulsating sounds, during rotation. The noise is no doubt partly the result of magnetic and electrical jerks which set the whole machine in vibration. This action would probably affect the bearings, but for the fact that the effects on any two diametrically opposite portions of the armature balance and neutralize one another. These pulsations are mainly a succession of magnetic and electrical attractions, but added to these there is the molecular "Joule effect," of alternate elongations and retractions of the iron. This latter is probably not a serious matter. Added again to these is the ordinary pulsation or beating of the air—a purely mechanical cause of sound. The remedies for this state of things, where it is found to exist, are simple, viz., a large number of projections, a sloping away of the inside faces of the pole pieces at the edges, and a smooth surface of the armature as a whole, together with a transverse or slightly spiral arrangement of the projections. The latter would cause the coils to occupy when at the neutral regions, planes cutting those regions, but even if the opposite ends or portions of the coils were in active parts of the field they would have no current produced in them, as they would be the seat of equal and opposite electromotive forces.

If, however, a smooth armature core is used, the actions alluded to disappear for the most part, and the question resolves itself merely into one of magnetic resistance. Probably it will be found in practice that the utilization of the whole of the armature surface for placing the wire will so reduce the depth of air space that the magnetic resistance will, taking all the circumstances into consideration, not be sensibly greater than when projections are used. The matter is one which appears capable of a ready solution by calculation; but if the magnetic and electrical conditions are not either strongly in favor of, or opposed to, the use of projections or teeth, there is little doubt that the presence of such teeth affords a ready and secure means of supporting and holding the coils in place, an advantage which is by no means to be overlooked now that magnetic fields have become so strong that the tendency to displace coils or individual wires, perhaps rendered slack by expansion from centrifugal force and heat, is very considerable.

So much, then, for the form of armature which Mr. Immisch has adopted, no doubt after full and careful consideration, and in accordance with the practice most in favor with experienced constructors. The form of field magnet employed presents no novel feature. It is the well known form with a double magnetic circuit, which has been for so long used by Gramme, Siemens, and others, but which has lately to some extent been abandoned in favor of the single circuit or "horse-shoe." It is interesting to note that in the earlier forms of this motor a peculiar cutting away of the pole pieces was adopted at the sides from which the armature was retreating. This was for the purpose of preventing a backward pull exerted by the pole pieces upon the Pacinotti projections. Such an action could only have resulted from the use of an unsuitable field and a small number of projections, and we are glad to see that the ordinary or normal type of pole piece has, with proper excitation, been found the best, especially as the construction alluded to would incapacitate a motor from running in either direction, or at least would cause it to give unequal effects in the two directions. The manner of connection of the coils of the armature and the construction of the commutator is unusual. It originally bore some resemblance to the Brush and Thomson-Houston forms, and was rather intricate, having, in the motor shown at the Inventions Exhibition, the peculiarity that the most useful coil was cut out of circuit as well as the idle coil. This was certainly a feature which Mr. Immisch has done well to leave behind him, together with his former disbelief in the existence of a counter E.M.F. in motors, which was once the occasion of a somewhat heated correspondence in our columns. The arrangement of the commutator has undergone some modification in the latest forms, the coils in the neutral region of the field being now short circuited, and not open circuited, and the whole of the other coils being retained in operation. As the number of armature coils is considerable, it will be seen that this arrangement gives practically the effect of an ordinary or Gramme "collector," and, as we said at the outset, we imagine that eventually this special commutator will disappear, and the well proved and simpler "collector" will take its place.—*London Electrical Review.*

Gilding by Deposition.

A process for gilding or decorating glass with gold and silver has been brought out by the Glass Decoration Company. It is stated to be a revival of an older process, or in other words the discovery of a lost art. The metal is precipitated on the back of the glass, and then coated with a protective composition which excludes the atmosphere. Some time ago it was found that platinum and other metals could be fixed on the back of glass by the electric discharge. But this discovery has not been so much heard of as might have been supposed, says *Engineering*. The method by precipitation deprives ordinary gilding of a serious drawback, namely, its destruction by the atmosphere.

Hydrogenated Palladium.

According to Professor C. G. Knott, in a paper read recently before the Royal Society of Edinburgh, if a wire of palladium be dipped into an electrolytic cell so as to become hydrogenated throughout half its length, and the ends of the wire be connected to the terminals of a galvanometer, a current will be obtained in the latter when a flame is allowed to play upon the middle of the wire at the limit of the hydrogenated and non-hydrogenated palladium. This current is due to a thermo-electric effect between the two portions of the wire. The current rises to a maximum, then diminishes to zero as the temperature of the junction is further increased to a red heat. There is no such current during the cooling of the wire.

"Go Quicker'n Lightning."

A boy about 10 years of age was rushing along the street of a Dakota town as fast as he could when he happened to meet his father.

"Here, hold on!" cried the parent, grasping him by the arm, "you'll make yourself sick running so on such a hot day. Come on home to dinner."

"L-leggo 'o me dad!" panted the half-exhausted boy, "there's a bully dog-fight down there, and I wanter go and"—

"Dog-fight?" exclaimed the father, getting excited. "Great Scott! what are you standing here for? Go on quicker'n lightning and show me where it is!" and the boy dashed away, making frantic efforts to keep from being stepped on by his parent, tearing wildly behind.—*Estelline* (D. T.) *Bell.*

—— Adam Forepaugh offered to light the Statue of Liberty one week, and, if no other public-spirited citizen took the job off of his hands, said he would continue to bear the expense.

—— A preliminary certificate of the West Troy and Green Island Electric Light Company, New York, limited, has been filed with the Secretary of State. The amount of capital stock is placed at $50,000, divided into 5,000 shares of $10 each. The corporators are: Thos. Knowlson, Otho E. Michaelis, William E Keating, Dudley Farlin and William Headlam, Jr.

—— The West Troy and Green Island Electric Light Company, limited, for the purpose of buying, selling and holding real estate, and supplying and applying electricity for the purpose of lighting public streets, etc., and motive power, and the process of heating, was incorporated last week. The capital is $50,000, and the principal office is in West Troy, and the trustees are: Thomas Knowlson, Otto E. Michaelis, William E. Keating, Dudley Farlin, and William Headlam, Jr.

If the management of the Gas Works should go out of the hands of the city it would sooner or later fall into the hands of the Standard Oil Company by that gravitating tendency in business which puts every valuable franchise in the hands of those who will pay most for it. The Standard Oil Company can outbid other competitors, for the reason that it can make gas out of naphtha and the other comparatively cheap and waste products of petroleum. There is hardly a doubt that before many years gas will take the place of coal in all large towns and cities for heating purposes as well as for an illuminant. The control of the gas mains of the city in such a contingency might be a matter of far greater importance than it now is. It is certain that the streets, which must be the underground highways for gas, water, electric wires and drainage, ought never to be intrusted again to a divided supervision. This is one of the objections against turning over the gas mains to a private corporation, which admits of no solution compatible with the public interest.—*Phila. Record.*

New Petroleum Engine.

A dispatch from Berlin says: An Austrian electrician named Marcus is supplying the German navy with a newly invented petroleum engine for torpedo boats. The engine is set in motion by electro-magnetism, and is more powerful than a steam engine of the same size. It is not liable to explode.

The Electrical Transmission of Energy.

¶ Whilst M. Marcel Deprez has been occupied in carrying out his important series of experiments on the electrical transmission of power, between Creil and Paris, of which we have from time to time published particulars, M. H. Fontaine, who, at the Vienna Exhibition of 1873, made the first public demonstration of this nature, addressed himself to the task of realizing, in a simple and inexpensive manner, a means of electrical transmission which should fulfill the conditions of the imposing programme prepared by his scientific competitor. He first cut out one of the costly elements of the installation, by placing the generating and receiving dynamos in the same building, and by substituting for the line connecting the station at Creil with that at La Chapelle, a resistance equal to 100 ohms. Of course the objection may be fairly made that an experiment which is to serve as the basis of practical applications must be carried out as closely as possible under actual conditions, with a working line, which would introduce all the difficulties and contingencies of practice. But on the other hand this strict approximation to reality is purchased very dearly, and the information it affords is scarcely worth the cost of 112 kilometers of heavy cable, and special posts required for the Creil experiments. When it is possible to obtain at a nominal cost the equivalent of this line, with the additional advantage of being able to follow each phase of the experiment at both ends at the same time, without any of the complications inseparable from widely separated stations, there can be little question as to the advantage of M. Fontaine's method.

The experiments were carried out at the works of the Compagnie Electrique, and no new apparatus was introduced during the trials. The dynamos employed were Gramme machines of the "Superieur" type; but in order to attain the enormous tensions employed by M. Deprez with his specially constructed dynamo, M. Fontaine placed four machines in series in such a way as to obtain a fall of potential of 6,000 volts; the current was about 10 amperes. The receiving machines were three in number, of similar type, and also arranged in series; and the primary motor was a 100 horse-power engine. Under these conditions an experiment was carried out by M. Mascart, with the following results, which were embodied in a paper submitted by him to the Academy of Sciences, on the 20th of October last:

Speed of engine	56 rev. per min
" generator	1298 " "
Difference of potential at the terminals of 1st dynamo	1490 volts
Do. 2nd "	1505 "
Do. 3rd "	1493 "
Do. 4th "	1508 "
Difference of potential at the end of conductor	5996 "
Resistance of line	100 ohms
Current	9.34 amperes
Power of engine	112.8 horse-power
Useful energy of engine	85 per cent.
Energy imparted to generating dynamos and transmitted to receivers	95.88 horse-power
Speed of receiving dynamo	1120 revolutions
Work delivered at the brake	49.98 horse-power
Efficiency	52 per cent.

If these results are compared with those embodied in the report of M. Maurice Levy upon the Creil experiments, it will be seen that the two experiments have been made under technical conditions practically similar. But the former are far superior as regards the economic phase of the problem. M. Levy estimates that the transmission of 50 horse-power from Creil to Paris would require a generating dynamo costing 50,000 francs, and a receiver costing 30,000 francs, besides the conductor. In the experiment of the Compagnie Electrique, the seven Gramme machines represented a total value of 16,450 francs, and a total weight of 8,400 kilos, so that the transmission of 50 horse-power through a resistance of 100 ohms involved, per horse-power, the use of 167 kilos of dynamo at a price of 2 francs per kilo.

These figures are interesting because they correspond with those under the best industrial conditions that have been realized up to the present time in the transmission of power through considerable distances. Moreover, it is evident that there would be a great advantage in using a uniform and commercial type of dynamo grouped to any desired extent, instead of building special machines for every separate nature of installation. Whatever may be their practical value, it is clear that these experiments of M. Fontaine mark a distinct progress towards the solution of the interesting problem of the transmission of power by electricity. —*London Engineering.*

Medical Uses of Electricity.

Before the Buffalo Electrical Society, in November, Dr. J. D. Bonnar delivered a discourse on the above topic. Electricity, he said, was essentially a stimulant, and the kind of stimulation produced depended upon the intensity and volume of the electricity generated. For instance, that which is produced by a friction machine gives a sharp, quick stimulation to the body, while the kind obtained from a voltaic battery gives a slower stimulation. "It may," said the lecturer, "be laid down as a fundamental principle that there are just two great diseased conditions, one of which, electrically considered, is positive, or, in medical language, hypersthenic, while the other class is considered negative or asthenic. Under the positive we include all such as are attended with inflammation, congestion, soreness, acute pain, bruises, fevers, sprains, extraneous growths, expanded muscles, and swellings of all kinds. Under the negative are included paralysis, local or general debility, contracted muscles, nervous prostration, coldness of the extremities, torpid liver, and inaction in any part of the system, with atrophy or tendency to decomposition, local or general." In disease there was an unbalanced condition of the electro-vital forces. Our bodies might be considered as an aggregation of delicately arranged organic compounds and simple elementary tissues, each possessing electrical properties. When any internal or external agent produces at any portion of the system a greater amount of electricity at that part than naturally belongs to it, the surcharged part exhibits symptoms of disease, and it becomes necessary to remove the excess of electricity. The methods for accomplishing this were then described by Dr. Bonnar, who attributed the relief given in such cases as the result of certain distinct and well-marked influences which electrical currents are known to exert upon the movement and decomposition of fluids. It is, he said, well known that liquids differing in specific gravity will, when separated from each other by a porous diaphragm, intermingle with each other. This action, called "osmose," is materially assisted by passing a current from the less dense to the more dense liquid, the liquid itself undergoing decomposition at the same time. The osmosis of the fluids of the body through the membranous partitions separating them is thus governed by the direction of a current passed through them and it is therefore natural to conclude that the cure effected, or relief obtained, is, in a measure, due to the fluids following in the wake of the current. Besides this, the chemical compounds and elementary tissue of which our bodies may be said to be composed, are subject to chemical changes under the influence of the passing current; and because the diseased parts are of a lower grade of vitality than the healthy parts, they are easily decomposed or reduced to simple substances, and carried off or expelled from the afflicted parts.

In describing that class of phenomena known as animal electricity, the lecturer mentioned a variety of ways by which electricity was developed, including pressure, combustion, heat, percussion, friction, etc., and stated that by the operation of any or all of these actions the body may receive electrical supplies. By rubbing the surface of the body with a silk towel, for instance, much service had often been rendered in cases of weakness. It was very necessary for perfect health to keep the body and clothes free from dampness. When from any cause our bodies are thrown into a state of perspiration, electricity and heat are carried off, which should be prevented as much as possible.

The Bartholdi Lighting.

By P. H. Vander Weyde, M. D.

Editors Electrical Review:

In addition to my suggestion of the peculiar form of reflector made, page 5 of this journal for November 13, I must say that there is an inherent objection to large metallic reflectors, namely, they are so much apt to become tarnished and require too frequent cleaning, especially when exposed, as would be the case with the torch of the statue. For this reason, Fresnel uses glass mirrors above and below the prismatic lenses, which, together with these lenses, throw all the light to the horizon. This may not be so well applicable to the case under discussion, as this presents a new problem. It would not do to transform the torch in a lighthouse lantern, but reflectors could perhaps be placed on the edge of the balustrade, for the double purpose to screen the eyes of the pilots against the glare of the light falling directly down and to throw that light toward the horizon. If a few lights are to be placed outside, so as to illuminate the statue itself, the same precaution should be taken, and that part of the light which falls down outwardly should be reflected either to the horizon or upon the statue, or both.

As access to the torch is not allowed, it is impossible to come to any definite conclusion as to the details of the changes which all agree are absolutely required. One thing is sure, however, namely: If the torch arrangement does not exhibit better judgment and more knowledge of the well-known methods of judicious illumination, as is the case with the arrangements below, intended for illuminating the pedestal, and which arrangements are accessible to the public, the failure of the torchlight is not to be wondered at. In the first place, the lights are enclosed in a tight box of masonry, with large sheets of plate glass in front, most of which glasses are already cracked by the heat, after having been used for only a very few nights. Then the reflectors, each of which is simply a flat strip of polished, silvered sheet metal, beat in the form of a parabola, have so absurdly short a focus that it became necessary to place the carbon pencils so close to the reflectors that they are burned and ruined in the center. Reflectors should have been employed of a focal distance of, say, ten inches, in place of one inch. The idea appears to have been to utilize the light radiating sideways, while forgetting that more rays go upward and downward. Even a spherical glass reflector, of say ten-inch focus, would do better, when the light was placed at some eight or nine inches distance, when it would spread out its reflected rays over the whole pedestal.

Better still would be plain locomotive headlights, with their oil lamps and parabolic reflectors; they surely would illuminate the pedestal, and even the statue, as well, if not better, than the present arrangement, and if the oil lamps were replaced by electric arcs, the illumination of the base by four such locomotive reflectors placed at the four corners of the fort would almost challenge sunshine. Such lighting would surely cost less than the illuminating arrangement now on exhibition, which I trust that soon will be abolished.

Will not a maker or dealer in locomotive headlights come forward and try a few of his lights for illuminating the pedestal? It is to be hoped that those in authority will give him permission to do so.

Philadelphia Electrical Department.

Councils' Electrical Committee met to-day for the first time in the new rooms of Chief Walker in the public buildings. The estimate of expenses for the coming year was considered. Last year the amount expended was $130,000, and this year $180 014 is asked. Of this amount $21,309 is asked for salaries, being an increase over last year, because of the employment of one extra janitor, three extra operators, one extra lineman and two extra inspectors. For repairs and supplies $8,000 will be required, and $10,000 is asked to extend the police and fire alarm system. To maintain the electric lights $71,760 is expected, and for additional electric lights to be erected $40,000 is wanted.

Electric Welding.

In *Engineering* (London) of November 12, appears the following rejoinder to the letter of Mr. J. B. Duncan, whose letter appeared in the Review recently:

To the Editor of Engineering:

Sir:—Your issue of October 1st contains a letter from J. B. Duncan, claiming to anticipate my invention of electric welding by "something like sixteen months."

There is no need of my reminding the readers of *Engineering* in what an "anticipation" consists, because it is evident that Mr. Duncan has not duly comprehended the method pursued in my welding process. He says: "I applied fully eighteen months ago the principle that there is a greater electrical resistance at a break than at any other part of a conductor, and consequently increased temperature at that point." Now there is no such thing as a break in my mode of procedure, the ends of the bars being abutted quite firmly together, and the volume of current used being such that should a break occur or be made during flow or current, an instant explosion and ejection of fused metal would result and prevent the formation of a good joint. Neither could I effect such a weld by a current capable of simply rendering the "filament of a lamp highly incandescent," and surely Mr. Duncan will not claim that by putting broken platinum wires together and keeping them so placed during passage of current, he will have a "break" at the place of contact having a greater electrical resistance than at any other point of the conductor, when, as he afterwards states, the filament of his lamp is retained in the circuit. I have nothing to say as to the nature of the ordeal which his filament would have to undergo were he to pass current of sufficient volume to weld the ends of the broken wires when held in contact without a "break."

Further, I have no desire to lay claim to any originality in having made the resistance of my circuit greatest where the highest temperature was needed, though Mr. Duncan has almost imputed such desire to me, if he has not ended by making such claim himself.

I am, respectfully yours,
Elihu Thomson.
Lynn, Mass., Oct. 19, 1886.

The Arc Light for the Streets.

The following appeared editorially in the N. Y. *Tribune:*

"The holders of gas stock in this city have always wailed plaintively in public when it has been suggested that the price of gas ought to come down; but it is said on good authority that in the privacy of their own homes the directors have never entirely given way to despair. The demand for the light which they dispense grows continually, despite the increased use of electricity; and if their dividends are reduced the improvement and enlargement of the companies' works do not look like immediate bankruptcy. The fact is that gas still holds its own in New York for illuminating purposes, and if the directors only had the wit to make it cheaper, new domestic uses, such as heating and cooking, would be developed. To claim, however, that gas is better for lighting the streets than electricity is ridiculous.

Electrical Work in the Territories.

The demand for improved electrical devices is not only increasing in the populous sections of the United States, but is rapidly extending in the Territories. In the mines of Idaho and Montana complete systems of electric calls are being put in by the United Electric Company, of Salt Lake City; incandescent plants are in demand in Utah hotels, the United Company recently installing a plant at Green river, and electric gas lighting is being adopted as rapidly as the residents are made aware of its conveniences. The increase of business has justified the United Company in opening a branch office at Cheyenne, Wyoming Territory, and orders for electric apparatus and electric construction are coming in from all the adjacent territories. Mr. C. F. Annett, the well-known telephone man, is president of the United Electric Company, and Mr. Charles S. Smith, formerly of Indianapolis, is secretary. The names of these gentlemen guarantee that their patrons will be satisfactorily served.

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We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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NEW YORK, DECEMBER 4, 1886.

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Mr. Jackson Bailey, the able and popular editor of our esteemed contemporary the *American Machinist*, was elected vice-president of the New York Press Club on Monday last by the largest vote ever polled by any officer of the club. He deserves to head the ticket next year.

Another cadaver has been resurrected which is to say "boo" to the Bell people, and whether the grave-diggers who have unearthed this last corpse are to be considered inventors or discoverers, may well occupy the members of all the cross-roads debating societies.

Somebody has discovered that a peculiar form of sounder invented for and to be used solely as a telegraphic receiver in 1868, by slight changes—the adoption of certain peculiarities which the courts have repeatedly decided are the sole property of the Bell Company—that this sounder may be made to do duty as a telephone receiver.

The object of the inventor in this particular instance was to produce an instrument with which to accomplish the receiving of telegraph messages by sound, without the intervention of a secondary circuit—a local battery and a local sounder.

It was to be used as a telegraph receiver, and invented to evade the great telegraph monopoly, which held a complete control of the telegraph field, as the Bell Telephone Company to-day holds the telephone domain.

If, as is indirectly claimed, the use of a sensitive diaphragm is to define the line of demarkation between a telegraph and a telephone receiver, how thick must the diaphragm or armature be to decide which of the two names must be given the instrument? It has been demonstrated that a telephone diaphragm may be effective up to a thickness greater than that used by some manufacturers a few years ago, in telegraph relay armatures.

Considerable stress, too, is laid upon the fact that a tube is attached, arranged to concentrate the waves of sound, so as to render more perfect the vibratory impulses, as if this sort of thing were new, or essential in telephone work. In the Bell instrument the sounds "get there" without any mathematical calculation of curves, angles and reflections, to concentrate the sound upon the tympanum. The average mezzo soprano whose surname is "Central," and whose given name on the writer's wire is Number Nine, is never troubled, and especially when there is chance for an argument, in concentrating the wave sounds sufficiently for all practical purposes.

The bottom facts in all this matter of undermining the Bell patents have been reached long ago by the courts. No one will be able to maintain a previous claim, so long as the decisions of the legal tribunals remain unchanged—and it will be very cool weather when these are reversed—so far Bell *et al* hold the field. Somebody, misguided, perhaps, or deluded, into putting money into opposition telephone inventions, is whistling, like a timid boy in the woods, to keep up his courage, till he can sell out, but it can hardly be credited that any sane person, who has followed the record from the commencement of this fight, can even hope that the decisions of all the courts in which the question of infringement has been canvassed will ever be reversed by the court of last resort, and it is earnestly to be hoped that the end is now quite near.

A NEW INDIA RUBBER.

The French chemists are constantly experimenting on various herbs, noxious weeds, etc., for the purpose of seeing whether these plentifully bestowed nuisances cannot be utilized, by extracting their oils, gums, resins or other valuable properties, or, reducing them to pulp or fiber, convert them into cloth, paper, or what not, and thus introduce or originate some new industry, and at the same time make these vegetable drones valuable.

Among the many roadside weeds which have been thus experimented upon is the *sonchus oleraceus*, generally known in this country as the "sow thistle."

The sow thistle—an adventurer here from Europe—has been shown to contain a species of rubber, and the ashes a large amount of potash. The process of extracting the gum consists in steeping the plant in bi sulphide of carbon (*sulfure de carbone*), and boiling the residue, after evaporation, in alcohol.

The insoluble portion, or rough gum, is now heated with alcoholic potash, and several times washed with heated dilute alcohol: by this treatment all substances of a waxy or greasy nature are removed, as well as the plant color. The residue is elastic, dark-colored, and presents all the characteristics of rubber, dissolving completely in chloroform and bi-sulphide of carbon, and only partially in ether.

There are obtained 4.13 per cent. of extractive matters, and 0.41 per cent. of unrefined rubber, which yields 0.16 per cent. of pure caoutchouc.

Another method of extracting the rubber is by first treating the plant with alcohol, and subsequently with benzine. Evaporating this the residue is found to be 0.92 per cent. of the weight of the plant. Treating this with alcohol produces 0.272 per cent. of a nearly pure rubber, of a light green color.

The sow thistle is only one of very many plants from which in all probability a native rubber, perhaps even a better form of insulating material than our commercial rubber, may be extracted. The common milk weed, all the forms of lettuce, dandelion and a hundred and one of our commonest roadside or meadow nuisances, may yet prove very valuable. The fruit of the osage orange, when cut, exudes a gum not unlike the milk of rubber.

The number of rubber-producing plants is already very extended. One of these, which only came to the front some three years ago from South America, was assumed to be a perfect substitute for our so-called india rubber. Its charateristics were peculiar, and partook of the nature of both rubber and gutta percha, and when applied, was just enough of either to prevent its being used as the other. It reminded one of the molasses which "had hardly hair enough in it to spin well, and rather too much to spread properly," and disappeared, carrying with it the immense fortunes which it was claimed were waiting in Honduras.

ELECTRICITY IN INCOMPETENT HANDS.

It is one of the misfortunes of scientific advancement that there are hangers on who impede and harass its every step by grasping rudely at the popular acceptance of truths stated, or an inclination to accept theories advanced, and turn these into filthy lucre. No sooner does a scientist announce a fact which is the result of study and thought on his part than some charlatan puzzles his brain with plans and invention for duping the honest public, and thus casts obloquy upon, and retards the progress of some grand discovery in chemistry, electricity or medicine.

Incompetent, because ignorant mountebanks have grasped at electricity as a curative application, with the most perfect pecuniary success to themselves, while bringing the use of this force for such purposes into disgrace through misapplication and failure to accomplish promised relief, or working positive mischief through want of elementary knowledge.

A recent paper on this subject by Robert Newman, M. D., in the *Medical Record*, has so much of good sense pervading it that it is worth while to reproduce portions of the paper showing how thoroughly ignorant of the first principles of the science of electricity many who are advertising to cure by this potent force are. The particular application referred to in the paper of Doctor Newman—a specialty of his own—he says: "had many imitators, and it is not surprising that amongst these were many medical men illy prepared to do the operation successfully, and totally ignorant of the proper procedure; their dominating idea being that any electrical instrument, used in any arbitrary manner, ought to give brilliant results, and failing in accomplishing these, they condemn and ridicule all reported cures by expert and careful operators."

In this specialty success has always rewarded the competent operator, but the doctor points out four general causes, either of which single handed must certainly bring the treatment into disgrace, while the entire quartette may often enter into combination to intensify that deplorable result.

Incompetence of the operator; mismanagement of the whole case; wrong diagnosis; faulty instruments.

The first of these four causes of failure should be sufficient at one time, and it is with this alone that we are dealing to-day. Says Dr. Newman:

"To succeed, the operator must be an accomplished surgeon and electrician, knowing the difference between a galvanic and an induced current, in the first place; and, secondly, having some knowledge of the different results obtained by each current on animal tissue."

How many practitioners are there who have this preliminary knowledge? Quoting from a letter written by one who possessed these pre-requisites, and who was practicing in Canada:

"I meet with a great deal of skepticism and ridicule from my professional brethren. A professor in a medical college here walked up to me in a drug store, and ridiculed my attempt to electrolyze some enlarged glands on the neck of a young man, and flauntingly offered to bet me $50 to $5 that I could not cure him or do him any good. Nevertheless the neck is improving markedly."

That professor is of just the proper stamp to undertake, when the moon comes round right, the cure of just such glands, and make a failure of the attempt.

The same writer says: "A professor of therapeutics argued with me that all batteries were alike, and the little old-fashioned crank-machine as good as any, but that they all did more harm than good. The professor of surgery asked me how I knew that destruction of tissue takes place in electrolysis, etc."

To show the lamentable ignorance of electricity which pervades the profession, the doctor says:

Letter No. 1, asks: "How many cells shall I use of an eighteen cell Kidder battery for curing a case of stricture, and how apply? etc."

"No. 2 wants to know if a gravity battery is not best, and if he may not use a rubber electrode."

"No. 3. How many cells and what sized electrode?"

"No. 4 insists on using an electrical machine to turn with a crank, and as his two hands are engaged thereby, thinks that one pole is sufficient, asking, of what use is the positive pole, when the negative does the work?"

No. 5 says he "used such strong currents that the patient screamed with pain, and notwithstanding, the result was not satisfactory."

Some of these would-be operators do not even moisten the sponge, others oil their electrodes.

In each of the above cases the parties had been furnished by the doctor through previously published papers, with all the necessary information—provided there had been a proper educational foundation for the superstructure—for the intelligent treatment of tumors and similar diseased conditions of the human system.

See what a mess they made of it, and do not wonder that electricity in medicine has such a struggle for a foothold.

How can it be otherwise, when the entire electrical outfit of a medical college usually consists of perhaps one static machine with a cracked plate or cylinder; half a dozen cells of Grove or Bunsen battery, the zincs honeycombed, platinums gone and carbons broken; a medical battery in which every screw is loose, the metal oxydized because the last chap who played with it left the solution in the cells; a "shocking machine," and a lot of professors who neither know nor care for the difference between a positive and a negative flow of current, who consider an interrupter and an alternating device one and the same, who in short believe to be precisely similar, any and all forms of electricity "which can make a feller jump and wriggle."

There are a few noble exceptions, but the rule is nearly enough universal to disgrace the world of medicine.

CHICAGO ELECTRICAL NEWS.

Readers of the REVIEW will recall to mind the original and ingenious experiments of an eminent scientist—one of the Siemens brothers—with electric light in its effects on growing vegetation. In the course of these investigations he showed conclusively that the naked rays from an arc light were highly detrimental to the well-being of the plant, while the same rays, strained through a thin transparent glass globe, very materially aided the growth and development of vegetable life. Various colored globes were used with varying success, but all of these were inferior for beneficial results to the clear glass.

All who attended the electric light convention in Detroit last summer, were struck with the healthy, vigorous condition of everything of a vegetable nature throughout the entire city, and the marked contrast between this and similar growths in other localities. The heavy drought of the summer, which had so generally parched and seared vegetation elsewhere, did not seem to have produced any deleterious effects there, while the seed and nut crops of the shade trees, and especially that of the horse chestnut—seemed something enormous.

Similar testimony comes from Davenport, Iowa. A recent writer says that the light from a tower falls full upon a flower garden about one hundred feet away, and during the past summer the owner has observed that lilies which have usually bloomed only in the day have opened in the night and that morning glories have mistaken the electric light for sunlight, and opened out their delicate corollas in the evening, rather than wait until daybreak.

In the City Council meeting on the 22d of November, Alderman Lyke had an order passed calling on the city electrician for an estimate for lighting all the bridges and viaducts north to Chicago avenue, and south to Twenty-second street with electricity. Prof. Barrett has been holding reception parties at intervals ever since. A thousand or less systems have been indirectly offered—each being just the thing, and the cheapest, all things considered. The interviews were all premature. By and by there will be more known in the matter. One thing is certain, however: when this field of lighting is occupied there will be no "temporary" wiring, and the plant will have to be a model one in every respect.

A Pittsburg correspondent tells of a poor deluded mortal in Ohio, who has spent a large portion of his life, and some $30,000 in electrical construction and other work—all of which might have been saved to him, had he had the benefit of a very small amount of elementary education in mechanics.

First his efforts were concentrated on a flying machine. This of course was a failure. Then an evaporating pan for sorghum realized some $10,000, and with this he plunged into the field of electrical invention, and in his laboratory, 30x150 feet, where he had already spent the larger portion of his life alone, or with his wife's child sister, he had continued his work. No one else was allowed to even look inside his workshop, until a few months ago, when his scruples were overcome, and two gentlemen visited his den.

The correspondent continues:

"The building, as I discovered later, was divided into three large rooms and a half-story attic. The outside was a prophecy of the interior. Tons and tons of wire, discarded magnets, wooden models and half-completed inventions were lying around, covered thickly with dust. In his poverty he could not afford to buy insulated copper wire, but from his once ample store he had taken Nos. 14 and 16 wire, and had insulated it by wrapping miles and miles of it by hand, using old clothes of all descriptions, torn in strips. This, in turn, had been used and handled so often that it lay in great heaps, broken or so little insulated as to be useless.

"Instead of the clean cut, delicate jars of to-day for battery cells he had some porous cups made by an Akron friend with pieces of common coke to furnish carbon, and hand-made wooden tubs as outside cells. For magnets, by the aid of a small pair of hand rolls, he rolled pieces of iron down to the thickness of paper, which he cut with a knife or scissors, and then built layer on layer of this till the desired thickness was attained. His tools consisted of a saw, plane, screwdriver, cold chisels, ax, hatchet, some worn-out files, a hammer and a monkey-wrench. All his turning was done on a grindstone frame, for which Tillie had supplied the power. All the wood used in his models he cut on his little farm, and sawed and seasoned in the workshop.

"In the second apartment we found the wonderful machine he had spent his life upon almost. It consisted of an engine and a dynamo electric machine. It was made entirely of wood, banded of iron. The wheels, spindles, gearing—in fact, everything that possibly could be—were made of wood. It was a wonderful piece of mechanical skill, and occupied a space of about fifteen feet square on the floor of the room. I saw his scheme in an instant. His dynamo was to furnish the electricity to turn the engine, which in turn was to supply power to the dynamo. The perfection of his idea, the completion of such a system, would be worth millions. Its value would be incalculable. It was perpetual motion. He had the entire resistance and friction reduced on all this mass of machinery, belts, etc., to about eight pounds. The weight of a child's hand could put the whole in motion. Taking into consideration the weight of these two machines and the hundreds of pounds of wire, it was remarkable to think that his little girl could start the wheels on their noiseless axles. Why, one coil of wire was the size of a bass drum.

"There was a little more wire needed to put the whole in working order, then it would do all he claimed for it. I did not want to discourage him, but I declined his urgent invitation to stay and complete the machine. It was as complete as it would ever be for all practical purposes. But he had achieved some remarkable things, and his own work had not been faultless wholly. The communicator that is found on all electrical machines was totally dispensed with by him. He had discovered a new system to supplant it, and there were no sparks or light about the machine in making or breaking the circuit, and hence no danger of destroying the machine or burning the armature. The dynamo was also adapted for arc or incande-cent light without any changing. The engine itself was perfect and he made some valuable improvements.

"'Why don't you take your engine alone to the East—New York or Philadelphia? There is a fortune in it if it is properly introduced,' I said.

"'Never, sir, never,' was his reply. 'I shall realize $25,000,000 for my idea, or nothing.'

"I found it useless to talk. A score of minor inventions that would be of infinite value in the electrical world were totally neglected. His central idea was the machine he had spent his life upon. Living in poverty and working day by day, he has material enough in the shape of tons of magnets, and wire, and brasses lying useless and neglected to buy a farm. In the rear room of his workshop I saw the plow and harrow and farming utensils he discarded almost a lifetime ago. The iron is rusted and the wood is slowly rotting away. His life is wrapped up in his engine and dynamo; all else is disregarded. It is the central thought of his life. The weeds have long ago taken full possession of his little farm. The roof of the laboratory leaks in places, but never above the machine. Mr. Cook neither chews, smokes, nor drinks. He is well educated, something of a physician, a skilled mechanic, and a kindly host."

"But it is $25,000,000 or nothing."

The Court of Appeals at St. Louis rendered a decision on the 23d of November, holding that contracts made over a telephone wire are binding. The suit was brought by the Globe Printing Company against Stahl & Co., on a bill for advertising. The defendants denied the validity of the contract, and had been defeated in the Circuit Court, whence the appeal was taken.

A new tunnel is being constructed, by which the water supply of Chicago is to be very materially increased—something like 25,000,000 gallons per diem. Upon the new crib, which will be placed at the lake end of the tunnel, there is to be placed a sixty-foot light-house, the illumination of which is to be electrical.

A severe storm was promised us for the 24th, the very mention of which caused everyone to shudder. It had started up in the far Northwest, and the signal service officials felt pretty certain the blizzard would put the thankfully inclined in good humor for the Puritan holiday, provided there was anything left that might be worth thanking for.

It didn't come.

Tuesday evening it was a trifle colder; but Wednesday it was announced that the storm had missed the road and gone gallivanting over into Canada. Thanksgiving, of the popular sort, was very generally observed by the people here, in consequence.

Buffalo, N. Y., has a contract with the Gamewell Fire Alarm Telegraph Company, for the Police Telephone and Signal Company's system, similar to that in use here, sometimes called the Chicago system, from its having originated here. One hundred boxes will be placed in the first instance, and the system, as it has everywhere, will grow rapidly. It only requires for that system to be allowed a foothold to become a necessity and a favorite, because of its convenience and rare efficiency.

"Bell's monopoly ended," is the heading of an article in one of our daily papers, issued the day after Thanksgiving. That sort of heading for that particular journal has become chronic. As a rule it displays one of that sort of scare-cat flings every few days. It has been said that there is some Pan Electric or other mouldering stock in the desk of some one who is interested in the articles referred to.

This letter—they are nearly all New York letters.—announces that an inventor has brought out a new telephone, which is a vast improvement upon the Bell! [This is one out of a hundred at least.] Mr. Marshall's new telephone is a condenser! So was Dolbear's. The writer, in company with the late DuMoncel, at the residence of that gentleman, in 1878, played and experimented with a condenser telephone, which Count DuMoncel called the singing condenser. So did Dr. Herz, who invented it, if memory is true, and so did Dr. Kern, and Charley Varny, and many others.

It really does not seem that the condenser as a telephone is entirely new to-day. There is at least one condenser telephone system down East, which is so firmly held down by an injunction that it hasn't vibrated for "years and cheers."

The Thomson-Houston Company are wiring the monstrous new Studebaker building on Michigan avenue, a stone structure six stories in height. When completed the plant will consist of forty-five arc and seventy-five incandescent lights.

The REVIEW has a way of quietly taking anything in the way of advertising which offers, provided there is a willingness on the part of the advertiser to accept the terms offered, knowing that perfect satisfaction has always resulted from this course, and on the other hand, has never worried if advertisers chose to assume to dictate prices and carry their patronage elsewhere. It has always pursued a policy where the old saying is applicable: "You pays your money and you has your choice," without decrying its neighbors.

An illustration of the effect of this policy was given the writer here the other day.

Two advertisements exactly alike were given two publications which reach the same class of readers. One of these was the REVIEW. Before the advertiser had received the current issue containing the first publication of the advertisement, he had an answer, and before the second issue he had several more, and not only got what he wanted, but paid the highest compliments to the medium which had so well served him. He says he knows now where to place his advertising.

The REVIEW will continue a policy which has done well by it in the past, and will do well by it in the future.

CHICAGO, Ill., Nov. 29, 1886.

Albe Homes, of Caribou, Me., has introduced the incandescent system of electric lighting into his starch mill, and it works to his complete satisfaction of course.

BOSTON ELECTRICAL NEWS.

The event of the week has been the consolidation of the Brush Electric Light Company and the Merchants' Electric Light Company, of Boston. Some years ago there was a movement to consolidate the above mentioned companies, and the Weston Electric Light Company of Boston. The result of such attempt at that time was an understanding among the three companies regarding prices and competition. Ruinous competition has been avoided, and while each have tried to gain some advantage by superiority of service, the public has been the gainer. The Weston Company first introduced incandescent lighting on arc circuits, and their success has required an increase of their plant at the Stanhope street station. Of late the Brush Company have taxed their electrical department to the utmost to supply current for incandescent attached to Sun Company boxes on their arc light circuits. The street lighting has been done by the Brush and Weston Companies, the Merchants' Company confining their attention to store lighting.

In the larger part of the city reached by the circuits of the Brush and Merchants there is no competition and, therefore, prices may now be regulated so as to realize a reasonable return on the investment. The Brush station on Ferdinand street, not far from the Providence R R depot, is perhaps the finest arc station in this country, if not in the world. It is built of brick of artistic design and equipped with all the appliances for producing economically and with perfect surety electric currents for light and power. The building is constructed strong enough to support heavy moving machinery without vibration. The power room on the lower floor is equipped with tubular boiler set with Jarvis furnace to burn cheap fuel, and Armington & Sims high speed engines and two Fitchburg engines, one upright of 50 horse-power and another lately added of 250 horse power. The next floor is filled with dynamos of the Brush type. The third floor is used for a storeroom and repair room.

The Merchants' station on Congress street is in what was once a store. The basement is taken up with boilers, furnaces, and steam making appliances. Along the center of the first floor are arranged 60 horse-power Armington & Sims engines, each belted direct to two Thomson-Houston dynamos. The company is also using a Fuller-Wood machine, and the dynamo (Daft) furnishing current for the Electric Power Company is run by an engine on this floor. The upper floors are devoted to offices and salesrooms of various concerns. It will be a question whether it may not be desirable to remove this station to some other part of the city.

Mr. Frank Ridlon, New England agent of the Brush-Swan Electric Light Company, was called on recently by a REVIEW representative to ask if he had anything to say regarding certain criticisms on his paper delivered before the Massachusetts Institute of Technology Society of Arts. His attention being called to how he would harmonize his strong recommendations of the Sun system with his own position as agent of the Brush-Swan Company, he said that the demand of the public for long-distance transmission of electric current for incandescent lighting was so urgent that he was led to seek some method by which the high tension Brush dynamos, whose current was of that ampere capacity rendering them, almost to the exclusion of all others, particularly adapted for multiple series incandescent lighting, might be utilized. The success of the Sun system which had enabled them to satisfactorily install the plants they had already in operation, had been largely due to the use of Brush dynamos.

A party interested in the distribution of gas, among whom there were Superintendent Neal, of the Charlestown Gas Company, and Treasurer Greenough, of the Boston Gas Company, made the rounds of the city one afternoon last week in company with Mr. Frank Ridlon, and visited the various electric light stations in the city.

BOSTON, Mass., Dec. 2.

Telephonic News

⁂ The West Coast Telephone Company (Pan Electric system) has petitioned the Supervisors of San Francisco, Cal., for the passage of an order granting it the right to lay down, maintain and operate, above or below ground, in the streets, wires for the transmission of electricity.

⁂ Concerning telephone extensions in Spain, the *Imparcial* says that telephonic communication is about to be established between the port of Motril and Salobrina, in the province of Granada, and that another line from Cangas de Tineo to Grado, in Asturias, is almost finished, and will shortly be opened for traffic.

⁂ The California Telephone Company has filed articles of incorporation. The principal place of business is Los Angeles. As the Bell Company have obtained injunctions against them in every State east they will probably not get further than to offer stock.

⁂ Ex-Senator Conkling was for some time the counsel of Professor Bell, of telephone fame; but it is reported that the connection has ceased. The rumor runs thus: That Professor Bell remarked in a conversation that the high-priced counsel did not always do the most work, and instanced Mr. Conkling as demanding large fees and being of no substantial value to the telephone company. This reached Mr. Conkling's ears, and caused him to remark that Mr. Bell and his telephone could go to limbo. This is given for what it is worth.

⁂ The REVIEW staff has been honored with complimentary tickets to the "third annual ball" of the Kansas City employes of the Missouri and Kansas Telephone Company, which occurs at Merchants' Exchange Hall, December 16th. The monogram invitations are very artistically gotten up, and the committees include the following names: Executive committee, D. B. MacQuarrie, president and secretary; J. D. Livingston, James Coleman, J. Marlowitch, C. C. Ballard, Downie Livingston, Vincent M. Masten, P. Ryan, J. K. Stitt. Floor committee, C. F. Edge, Director; Chas. Boggs, Herman W. Ritterhoff, W. C. Moore, H. W. Bellard, P. Donovan, Henry R. Ritterhoff, Joe Zenter, J. W. Ebert. The two former balls of this organization were quite successful, and no doubt this one will be equally pleasant and well patronized.

⁂ The Court of Appeals has rendered a decision holding that contracts made over a telephone wire are binding. The suit was brought by the Globe Printing Company against Stahl & Co. on a bill for advertising. The defendants pleaded that the contract was not binding because it was made over a telephone wire. Judgment was rendered against the defendants in the Circuit Court, and an appeal was taken. The Court of Appeals affirms the judgment of the lower court in an opinion by Judge Thompson, who said, in part:

"The telephone, although of very recent invention, has come into such common use that we think the courts may properly take judicial notice of the general manner and extent to which it is made use of by the business community. No doubt very many important business communications and transactions are made every day by telephonic communication, of precisely the same character as that of which the witness was allowed to testify in this case. A person is called up by one desiring to communicate with him by means of a connection of their respective wires, through what is known as the central office, and a conversation ensues. It may relate to the most important matters of business. The use of this instrument facilitates business to such an extent that it would be very prejudicial to the interests of the business community if the courts were to hold that business men are not entitled to act upon the faith of being able to give in evidence to juries replies which they receive to communications made by them to persons at their usual places of business in this way."

⁂ The Clinton, Mass., Wire Cloth Company has purchased the Marshall lot, containing about 9 acres, and adjacent to the present mill, with a view to extending the works. The Brigham lot on the line of the Boston & Maine, has also been purchased by the same concern, and ground has already been broken for the erection of a new galvanizing plant. The storage room for fuel and metals, the acid room and galvanizing kettles will cover an area of about 30,000 square feet. The building will be one story high, fire-proof, and its productive capacity will exceed 300,000 feet of netting and wire cloth per day. Some idea of this branch of business may be obtained from the fact that in addition to the storehouses in New York and Chicago, and in the mill proper, the company has rented the large building at Ayer Junction, on the Fitchburg railroad, known as the cheese factory, in which is stored about 7,000,000 feet of "hex." netting, and within the past month it has also rented for storage purposes Lowe's skating rink in Clinton, which is being rapidly filled with poultry netting for the spring trade. Experiments are being made in the works with the electric light—the Brush arc system being used. One of the mills has now been running nights for two years and the question of artificial light is an important one.

President Henry Howard, of the Providence Telephone Company, Talks About the Bell Company.

The Boston *Advertiser* recently said, in reference to Bell Telephone stock, that there was considerable feeling against the Bell Company for "riding roughshod over the Massachusetts law in demanding 35 per cent. of the capital of the Providence Telephone Company recently." That paper also said: "Although the Massachusetts Legislature passed a law last winter to the effect that the Bell Company should not own more than 30 per cent. of the stock of any other corporation, yet the president of the Providence Telephone Company states that the Bell Company have found a way to avoid the law so that they insist upon and in all cases do get 35 per cent. in an indirect way. It was either death or acceptance for the Providence Company. Were it not for this Providence matter the American Bell Company would now be entering on the high tide of popular favor."

The Bell Company formerly exacted 35 per cent. from the local exchanges, but as the Massachusetts law reduced this to 30 per cent., the parent company obtained the extra 5 per cent., which it was compelled to make, for the privilege of a connection with the American Telephone and Telegraph Company, which controls what is called long-distance telephony between Boston and New York. Thus while the Massachusetts law prevents the Bell Company from taking more than 30 per cent. of the stock in the local exchanges, it indirectly gets 35 per cent. by the method just mentioned. That is probably what is meant by the statement in the Boston *Advertiser*.

In conversation with President Henry Howard, of the Providence Exchange, a reporter of the Providence *Telegram* learned that that official had been wrongfully quoted by the *Advertiser* and some other papers.

"The statements made in some of the papers recently convey a wrong idea," said President Howard. "I made no such complaint, nor has any complaint regarding the present management of the Bell Company been made by me nor by any other official of the Providence Company. The remark 'riding rough shod' is not one of mine. We have no complaint to make."

"Was there formerly cause for complaint?" the reporter asked.

"Some years ago," replied President Howard, "we thought that we were very harshly treated by the Bell Company, but recently things have changed somewhat, and I do not know as I have any reason to find fault with the action of the parent company, although it is true that its exactions are generally regarded as rather severe. But we have no occasion to find fault with the methods of the present officials, who are only carrying out a policy long ago established. The impression created by some newspapers that we were specially dissatisfied at the present time on account of recent events is not well founded."

"Was it really 'death or acceptance' for the Providence Company?"

"The franchise under which we have been working would expire in a year or two, and it was not for us to dictate terms as to a new contract. They could give us one or not as they pleased, and if they chose to take it away altogether and give it to somebody else we could not find any fault. The point I made in this connection was, therefore, that we would either have to buy at their own price or leave the field to somebody else."

"In regard to the general policy of the Bell Company?" suggested the reporter.

"The general policy of the Bell Company having been fixed years ago, and the present managing officials being compelled to execute that policy, under these circumstances the conduct of the company towards us in the present instance has been unobjectionable. Indeed, we have received nothing but civility and courteous treatment at the hands of Mr. Bowditch, who is vice-president, and has to a great extent the direction of affairs, and from Mr. Hudson, the general manager. In my intercourse with them I have found them both to be gentlemen in the best sense. I think both disposed to be as liberal and considerate toward the local exchange as they can be under the existing and pre-established policy of the Bell Company, which years ago fixed on high prices."

The Invention of Telegraphy.

Apropos of the many reminiscences that are now appearing concerning the early history of the electric telegraph, we publish the following from the pen of Mr. W. H. Ward, at present residing in Monongahela City, Pa., but at the time of writing (October 16, 1879) a resident of Auburn, New York:

It may be of some interest, and perhaps information to some of your readers, to learn of some of the trials and difficulties which inventors have to experience—and the greater the invention, the greater the difficulties to overcome—prejudicial, professional, and mechanical. With your permission let one be cited as an illustration of the many; and that one the Electric Telegraph, and the manner in which its accepted author, Prof. S. F. B. Morse, had his first impressions respecting it. It was on this wise:

On his return trip from Havre, France, in October, 1832, while in conversation with some fellow passenger, he (the Professor) was asked if he had seen while in Paris an electric machine. He replied, "No." His fellow passenger commenced to inform the Professor what had been accomplished with the machine referred to, unto which Prof. Morse replied by saying, that if that was so, there would be no difficulty in communicating information between distant points. So much was he impressed with the force of his ideas as to coming results, that instead of following his wonted or professional duties, he at once commenced applying himself diligently to the task of producing mechanical action by electricity.

Here we must leave the Professor with his electrical appliances for ten years' continual labor, at the end of which he put in an appearance to the Secretary of the Treasury and Postmaster-General at Washington, with what he then believed to be the thing, but made little headway. Through those gentlemen, however, he was enabled to get it before the proper committees in Congress, himself having a room in the Capitol, with the two ends of a six-mile wire in the same room to show forth results, by ringing a bell or making marks on soft paper. One of the U. S. Senators, who was brought in by a New York M. C. to see the results, after witnessing the Professor produce impressions on strips of soft white paper, ring the bell, etc., the said M. C. informs the said Senator "that the Professor could produce like results between the Capitol and Baltimore in the same incredible space of time." The Senator turns to the Professor, and, looking him in the face, asks: "Do you state this for a fact?" The Professor answered, "Yes"; to which the Senator retorts by saying "that he had considered him (the Professor) cracked, but now he was satisfied he was a fool."

The bill passed the next session of Congress between 12 and 1 o'clock on the morning of March 4th, 1843, when said Congress expired, appropriating $30,000 for a line between Washington and Baltimore, to be spent under the direction of the Secretary of the Treasury.

This information was given ventilation by the press with varied views—some with ridicule, others sarcasm, and few to commend. The ventilation, however, brought inventors to the surface with all kinds of electric machines, devices, and appliances. The writer being in the Patent Office at the time, knows whereof he affirms. Among those that had some relation to the present telegraph was one by Mr. Cornell of this State, for laying the wires under ground. It was a plow, arranged to support a reel of lead pipe, containing the electric wire in coils of about 200 yards in length. The plow would occupy a space about one and a half inches in breadth and eighteen inches deep—so that as the plow proceeded this lead pipe with its wire would pass down through a slot in the center of the plow in such way as not to cause any sharp bend, or crook. By this method it will be observed that the electric wire could be put down eighteen inches below the surface as fast as the team would draw the plow, which was tried in April, 1841.

By the time 600 yards were down, it was discovered that the power of the batteries was neutralized by the earth's attraction; when the Professor leaves the parties who were engaged in thus laying it, and in haste comes to the writer, reeling like a drunken man, from sheer exhaustion, feeling that all was lost.

The writer asks: "Why, Professor, what's the matter?" He exclaims (and at the same time wiping the perspiration from his face, right and left): "It's all gone—the earth destroys the batteries." To which the writer replied, "Professor, hang it up." On hearing this the Professor leaped up and moved off at a high rate of speed, to where he had left the men, and shouted, "Hang it up, boys;" when Mr. Cornell suggested that poles be planted to hang the wire on."

From that time things progressed, and at the time the Whig nominating convention met at Baltimore in May, the name of the Vice-President was wired from the Relay House to Washington. In three days afterward, a message between the two cities, accredited to Miss Annie G. Ellsworth, was sent—"What hath God wrought!"

The pioneer workers at the time referred to, were the Professor and his partner, Mr. Alfred Vail, of New Jersey, assisted by Mr. Cornell (the plow inventor) as superintendent of construction, with Mr. Commissioner of Patents Ellsworth, and the writer as advisory help, and it was the latter who suggested the idea of hanging up the wires when informed by the Professor that the earth destroyed the batteries. Mr. Vail was inventor and patentee of the key now in use, also of four of the characters of the alphabet. Prior to his invention of the key, the operator would take the end of one wire between thumb and finger, and bring it in contact with that of the other, and so form the circuit, and obtain the mechanical force requisite for producing the indentations indicative of the letters of the alphabet on soft paper, by a three-pointed instrument or pen.

.... The Electric College Dispensary has been incorporated. The officers for the first year are Frederick R. Lee president; James Rascover, vice-president; John A. Bennerman, secretary, and Albert W. W. Miller, treasurer. The trustees are Camden C. Dike, George W. Boskowitz, Chauncey Schaffer, Thomas N. Rooker, John J. Kiernan, George W. Thompson, Ovid A. Hyde, Adolphus M. Lesser, Daniel H. Capella, Abraham W. Tompkins and Henry E. Waite.

Various Lines Competing in Early Times with the Western Union.

THE ATLANTIC AND PACIFIC, UNION PACIFIC, CENTRAL PACIFIC, THE DESERET COMPANY, AND JAY GOULD'S AGGRANDIZEMENT OF ALL

A Western correspondent says that in view of the near completion of the Mackay-Bennett postal telegraph line to this coast, a brief recital of the previous opposition to the Western Union Company from East to West may not be devoid of interest. As old pioneers will remember, the first telegraph line on the Pacific coast was the California State, which afterwards merged into the Western Union. George H. Mumford was for a time general superintendent, and was succeeded by James Gamble. During the "sixties" the Atlantic and Pacific States Company was formed, the stock being principally taken up by San Francisco stockbrokers, and the main business done being between San Francisco, Virginia City and other Nevada mining towns, although the line took in numerous other towns in California and Nevada. The Western Union bought this company up and had no other opposition on the coast until the building of the Union and Central Pacific railroad lines, when a complete circuit from New York to San Francisco was effected. This was brought about by a consolidation of the Atlantic and Pacific Telegraph Company and the Union Pacific and Central Pacific railway wires. The Atlantic and Pacific Telegraph Company had a line extending from New York to Omaha. Here they made connection with the Union Pacific, and at Ogden with the Central Pacific. Besides this there was the Pacific and Atlantic Telegraph Company, running from Chicago east, the Southern and Atlantic Company, running east and south, the Boston and Franklin throughout the New England States, and the Dominion lines through Canada.

In the service from the Pacific coast these companies were all used; that is, if a message was started from San Francisco, it would go by the Central Pacific line to Ogden, then over the Union Pacific to Omaha, then over the Atlantic & Pacific, if they had an office at the objective point; if not, to the Pacific & Atlantic; if to Canada, to the Dominion Line; if South, to the Southern & Atlantic; if to the New England States, to the Boston & Franklin; and if there was no other way, in order to reach its destination, the Western Union Company at the most convenient or nearest office to which the message had to be transmitted.

Cable messages were taken and transferred to the Western Union Company at New York, and by that company to the cable company, answers invariably being handled all the way by the Western Union. In 1876, however, the United States Direct Cable Line was laid, and the opposition was thereby enabled to handle cable telegrams from San Francisco, Omaha, Chicago, New York or other points, both ways.

On the connection being made from east to west, which was in the year 1869, the Union and Central Pacific Railroad Companies proceeded to build additional wires, from time to time, other than required for railroad purposes, and also extended to principal points off the line of their roads, and in large cities and towns, offices independent of those in the railroad station or uptown offices, strictly speaking, for telegraph purposes were established to do nothing but press and commercial telegraphing. The Central Pacific constructed a line to Virginia City, Nevada, and followed one with all the railroads they built, namely, from Sacramento along the Oregon line, from San Francisco to San Jose, Gilroy, Watsonville, Hollister, etc., and eventually through the San Joaquin Valley to Los Angeles, and across the Colorado desert to Yuma, Arizona, where a connection was made with the military line. At Winnemucca, Nevada, a connection was made with a line built by mining speculators to Silver City, Idaho, South Mountain, Boise City, Baker City, etc. At Ogden, Utah, connection was made with the Deseret Telegraph Company, running to Salt Lake and other adjacent points; thence to Pioche, Nevada (then a great mining camp), Bullionville and twenty or thirty other towns. To these points the opposition had the first connection, the Western Union Company subsequently building the line to Pioche by a more direct route.

True, the Western Union Company could transfer messages to the Deseret Company at Salt Lake for Pioche and so on, but like the old cable snap the answers would come back by the Central Pacific division of the Atlantic and Pacific Company.

About the middle of the year 1877 Jay Gould, who was interested in Atlantic and Pacific Telegraph Company stock, and also in Union Pacific Railroad stock, became largely interested in Western Union securities. This was the breaking up of the "opposition." First the Pacific and Atlantic Company was gathered in, then the Southern and Atlantic, Boston and Franklin, Atlantic and Pacific, Union Pacific, and United States direct cable line. This left the Central Pacific all alone with its Western connections. The company refused to sell its wires, but in the month of December, 1877, agreed to lease them. The lease was effected, and December 31, 1877, the Western Union Company took charge, and opposition was a thing of the past. The lease of the "C. P." wires naturally gave the lessee virtual control of all the other small companies it connected with on this coast. Subsequently the Mutual Union Company started, then the American Union, both of which were soon gathered in. Now we are to have Mackay's postal system as another competitor.

Underground Wires in Boston.

Early in the spring the Edison Electric Light Company and the New England Telephone Company put in petitions to the city council for permission to lay wires under ground. After considerable discussion before the Committee on Underground Wires, and explanations of the system which it was proposed to use, permission was granted to the Edison Company to lay wires in Carver, Tremont, Eliot, West, Bromfield, Milk, Congress, State, and Court streets, and Head and Temple places, and Tremont row.

The New England Telephone Company was granted permission to lay wires by their system in a district extending from Indiana place on the south to State street on the north, and between and including Washington and Albany streets. It was developed at the hearings before committee in the spring that the two systems could not be laid in the same trench or in trenches close together, because the vastly greater power of the telephone current would cause static reduction or a disturbance and disarrangement of the weaker current. About two weeks ago the Edison Electric Lighting began work in laying their system on Eliot street, and are now working on Tremont, West and Bromfield streets, having about 100 men employed.

DETAILS OF THE SYSTEM.

The system is one which has already been in use in New York city, where there is some 22 miles of underground wires, supplying 20,000 electric lights. It is known as the three-wire cable system. The cables consist of iron tubes, in 20 feet lengths, in which are three copper wires each embedded in an asphaltum insultating compound by which they are kept in contact from each other, and from the tube. These main cables are about 6 inches in diameter, and the wires are about 1 inch in diameter. At the end of each length is a junction box, from which smaller cables can be carried, or from which the smaller wires can be carried into the houses.

From the central station in Head place there radiates a great number of large insulated wires called feeders, to large boxes at convenient distances, and from these boxes radiate the smaller mains or cables above described. These mains go out into a certain district, and while there are a number of these districts, the whole system is united so that there can be an equal pressure of electricity throughout. The pressure and flow of electricity in each district, according to the number of lamps burning, can be regulated from the central station and the amount of electricity flowing in each district is shown by a delicate instrument to wires leading back from the ends of the feeders. The trenches dug by the Edison Company in which to lay their mains are about 2 feet wide and 2 feet deep.

"Married Man's Indicator."

A MARVELOUS INVENTION FOR DOMESTIC USE—HOW TO FIND THE KEYHOLE.

The latest genius who has applied for a patent, says the Washington correspondent of the St. Paul *Dispatch*, is the man who has invented what is known as "The Married Man's Indicator." It is a wonderful, sensitive arrangement of the ordinary thermometer in convenient pocket size, and is graded to a scale of cabalistic marks, which show the exact state of the domestic atmosphere at any hour of the night. The hard-worked and belated husband arrives home say about midnight. He takes out the indicator, thrusts it in the keyhole, and lets it remain there a few seconds. Pulling it out quickly he scans the dial by the moonlight's fitful gloaming. If it marks "S. A." (sound asleep) the poor husband pulls off his boots noiselessly, uses the night-key with bated breath, gives the door a quick pull to keep it from creaking, steals trembling to bed, and when his dear wifey wakes up about two seconds afterward and wants to know how long he has been home he is sound asleep. If the indicator scores "A. A. C., B. D. K. W. T." (awake awful cross, but does not know what time it is), the husband puts a few more grains of coffee in his mouth, opens the door boldly and walks in with a slam-bang air, hits his boots intentionally against a chair, wants to know why the devil chairs don't keep out of his way, gets desperately mad on general principles, scares his wife clean out of her crossness and curtain lectures, refuses to let her get up and strike a match—never did like a light at night no how—remarks gruffly in response to a timid query that "it's about twenty minutes after ten," and then turns into bed with such an apparent awful state of mind that the wife of his bosom is afraid to speak to him, at which he is very sad, of course.

There are other marks on the indicator, showing just where it will do to play the "lodge dodge," or the "sick friend," or "been standing on the corner talking to so-and-so for more than an hour," or "general or honorable this or that from you know where was in town and had to go away on the 2 o'clock train, and he insisted so strongly that the whole party stayed up to see him off, although he was a great bore, and we only did it through courtesy." But the most awful of all the cabalistic signs on the dial is the one at the top, about two marks above boiling point.

When the weary husband comes home about 4 A. M. from the direction of the butcher shop, with a roll of meat held high in the air so that every one who passes cannot fail to see it, and sticks the indicator in the keyhole, he is almost too weak to draw it out. With hair on ends he reads it by the faint light streaming in upon him from over the eastern hills, and sweat breaks out upon his noble brow in drops as large as walnuts as he sees the bulb of the indicator jammed smack up against "R. H. S. W. F. Y. I. T. D. (red-bot, still waiting for you inside the door). The inventor of the instrument says that when a man has this terrible misfortune to overtake him, he feels that there is nothing left in life worth living for.

He slings the meat out into the yard and braces himself for the coming fray, but says nothing, for nothing can be said. Be he ever so gifted a liar, his accomplishment is more than valueless. No lodge, no sick friend, no talking on the corner, no sitting up to see the General off, no swearing that he will never do it again—in fact, nothing will prevail. It is an indefensible case.

He is caught. Even the ghastly gayety with which two hours previous he had said to the boys he guessed he would see it out, "might as well be killed for a sheep as a lamb," had all vanished. The indicator having told him the exact state of things, he knows exactly what to do, and that is nothing but get in bed at once and wrap the drapery of his couch about him, pull the pillow over his ears, and wait for his wife's breath to give out. It's awful while it lasts, but it has its use in relieving the unfortunate husband of his great load of anxiety. The indicator is a great invention. Col. Montgomery will allow it to go through, if possible.

TELEGRAPHIC

... The Western Union Telegraph Company has a messenger boy at Easton, Maryland, 87 years of age.

.... Line men of the Commercial Union Telegraph Company have just completed the stringing of two wires between Burlington and Rutland, which are a link in the lines between Montreal and New York. One of them is a broker's wire.

.... The Signal Service cable between Block Island and the Rhode Island coast has been satisfactorily laid, under the supervision of Col. M. W. Goodyear, of E. S. Greely & Co., who returned last week, apparently in excellent health and unaffected by his experience with water. The expedition is reported to have struck several bars while putting the cable down—but most of them were on shore.

.... During the heavy gale which prevailed last Thursday the tug Wm. Hope was bound for New York city with the barge Harvest Queen in tow. While passing through Newburg bay the river was so rough that the tug could not weather it, so the barge was cast adrift and the tug went to the dock. The hands on the barge let the anchor go and in dragging caught the telegraph cable and parted it. On Saturday the tug Wm. Martin arrived at Newburg with a gang of men and repaired the broken cable.

.... The wires were down between Washington and New York yesterday, owing to the gale of Wednesday night, and the United Press operator was having a hard time getting the news.

"This is rough," he said, kicking in the ribs of a Leyden jar.

"What's the row?" asked the telegraph editor

"Why, we've got to get New York by way of Cleveland."

"Can you get it that way?"

"Oh, yes, we can, but it's mighty uncertain."

"That's just what a good many Democrats think," remarked the editor, as he crept behind a paste pot and watched the operator groping around to get a hold.—*Washington Critic*

.... It was on the eve of an election in the municipality of Pxkipl. The rival candidates for a seat in Congress were H. I. Tenshun and L. O'Tension, and the campaign was fought on the question of the protection of American laborers (electric light trimmers, etc.). The tickers were ticking, and the line batteries held their reserve electromotive force for the grand struggle in bringing in the returns. The telephonaudinacular lately invented was now for the first time being used for campaign purposes. Enormous instruments re-transmitted the sound of the voice with such tone and volume that large audiences could listen. At every town in the district vast crowds were assembled to listen to H. I. Tenshun. He was introduced at the transmitting instrument, when three cheers and a tiger were given at forty different halls in the district. Then there was a wait. The crowds waited patiently for ten minutes, and the voice of the speaker was heard, admitting that the principles of his opponent were better, from a business point, and, in fact, saying such things as would hurt himself and help his opponent. This occurred in all the meetings except the grand rally in Pxkipl, where a good high-tension speech was heard. At the election L. O'Tension carried the district; but his opponent took the district, for the committee on elections were convinced that the voters were won over by fraudulent induction. Two years later the district committees were made up largely of electricians and men who knew how to pull wires.

Experiments Communicated by M. Fontaine on the Transmission of Power.

By M. Marcel Deprez.

M. Fontaine has lately submitted to the Academy an experiment on the transmission of power by electricity, by means of a process which he considers novel, and which consists in substituting for the generating and the recipient machines a collection of machines connected in series, and in such a number that the sum of their electromotive forces makes up the value which it is desired to obtain. In the experiment in question the number of generators was four, and the number of the recipients three. This idea is far from novel, and it has been proposed by all the electricians who have sought to obtain high tensions without having recourse to the construction of the special machines which I have been the first to realize.

As for the method employed by M. Fontaine to govern simultaneously the four rings of the generators, it much resembles that described in a patent which I took out on April 28, 1885, in which I gave precisely an example of the application of this procedure to a machine with four rings of 0.30 meter in diameter and 0.20 meter in length, like those of the machine which served for the experiments in the works of the Northern of France Railway in February, 1883. There was thus produced an apparatus, each ring of which could give a force of 1,500 volts at 1,000 turns per minute, the internal resistance of a ring being 5.5 ohms, and the total resistance of the four inducers being 15 ohms. The weight of the acting parts was composed of :

Soft iron.....	1,124 kilos.
Copper.....	652 "
Total.....	1,776

On adding 600 kilos for the support, it will be seen that we had arrived at a total weight below 2,500 kilos for a machine with four rings capable of producing 6,000 volts and 10 amperes at the speed of 1,000 turns per minute. This is half the weight of M. Fontaine's four machines. These results admit of no doubt, since they are obtained by the addition of the effects of identical machines perfectly known.

But this project was not continued, because the conditions laid down for the experiments at Creil were quite different. The machines of M. Fontaine revolved at the speed of 1,300 turns per minute, those at Creil made only 500 turns in the same time. The linear speed of the rings of M. Fontaine is 20.5 meters per second as against 7.5 meters for those at Creil. If I had given the latter a linear speed of 2.05 meters, they would have yielded an electromotive force exceeding 16,000 volts. The conditions are in no manner comparable, as it will be seen, and if the Creil machines are heavy it is simply because only a very low speed is required of them, and nothing has been done to lighten them. If in the arts we were to compare machines among themselves, taking lightness as the main condition, the engines of torpedo boats would be far superior to those in factories, and yet the use of the latter is far more general, though they are much heavier per unit of power. The reasons for this preference are too evident to require explaining.

In this order of ideas M. Fontaine's expedient is the same as that of the manager of a factory, who, instead of a single engine of 100 horse-power, moving slowly and surely, should prefer to employ four small engines of 25 horse-power each, moving at a very high speed, and acting upon the same shaft by means of mechanical transmission, having for their object the reduction of the speed.

* * The news from Pittsburgh is to the effect that rail laying on the electric motor road is nearly completed from the Mt. Oliver Incline to the toll gate on the Brownsville road. A large force of men are at work pushing the road to completion.

Incandescent Lighting from Arc Circuits.

Editors Electrical Review :

Dear Sirs: In the Electrical Review of Nov. 20, 1886, appeared a paper by Mr. Frank Ridlon, on "Incandescent Lighting from Arc Circuit."

Allow me to ask a few questions, and to call the attention of this gentleman to a few facts, which he seems to have overlooked.

In regard to the operation of the distributor box, the writer states its action very simply, viz.: "The two solenoids or coils on the right and left of the box are so adjusted that when all the lamps are in operation, the spindle in continuation, the armature will rest lightly on the top contact or spring, the circuit of resistances being then open. If, now, a lamp be turned off or breaks, more current will be shunted through the solenoid of that side, and the armature be further attracted within the core, and cause the top contact to touch one beneath it thus closing a circuit through one resistance, taking up the current of the broken lamp, and preserving the balance of the circuit. If another lamp be turned off, the armature will be still more strongly attracted, and depress the first and second strips so as to make contact with the third, thereby switching in a second resistance equivalent to a lamp, and so on, until all the lamps are put out of circuit, and all the resistances thrown in."

From cuts in advertising columns, and from further remarks of the writer, I should judge that the action of each solenoid is to take charge of one of the 50-volt groups. Both solenoids, when in series, adapt themselves to 100 volts. Supposing now we have ten lamps burning on 50-volt 10 ampere circuit. One lamp fails, the difference of potentials raises to 55 volts, the solenoid becomes more excited, draws in the core to bring the first spring in contact with the second, thus cutting in the substituting resistance or lamp. This will have the effect of lowering the difference of potentials to the normal 50-volt. What now prevents the solenoid core to return to its former position it held, with 50 volts? There is apparently no reason why it should not fall back again, causing another increase to 55 volts, and keeping up this continual sea-sawing, very much like the action of a centrifugal ball-governor on a steam engine. The result would be a continual flickering in the lamps.

In the Electrical Review of Oct. 23, 1886, a description was given of a distributor used by the Schuyler Electric Light Company, for which a broad patent had been granted to Mr. Merle J. Wightman, July 13, 1886, No. 345,561. A model made in January, 1885, embodied the very same principle of contact-making as described by Mr. Ridlon, and shown in cuts. In this distributor box (described also in November number of *Electrician and Electrical Engineer*) the necessary additional pull for holding the core in its new position is obtained from the current passing through compensating resistance and a compound coil wound round the shunt coil.

Accompanying sketch will show the arrangement clearly. By inserting a new lamp in place of the broken one the difference of potentials being lowered to 45 volts, the core is allowed to go back, so cutting out the additional resistance, restoring the normal difference of potentials 50 volts. Of course the compound action is taken off with the cutting off of resistance. The first of these distributors has been put in public use on Feb. 19th, 1886, and nearly 200 have been supplied since to the different plants of the Schuyler system. Mr. Ridlon seems to be ignorant of even the existence of such a device outside the Sun Co., Woburn, Mass. Moreover, his so-called ideal series system has been in practical operation in the Schuyler Company's stations. In this system no substituting resistances are used, each incandescent lamp of any candle-power desired is looped in any arc circuit of 6 to 10 ampere current in exactly the same way as an arc lamp. There is necessarily a respective diminution in volts according to candle-power. An effective safety device, patented Nov. 16th, 1886, is contained in each lamp and cuts out the same after failure without interfering with the remainder.

The Edison Company has also made a similar attempt to light stores with incandescent lamps in series, but with not more than 4 ampere current. This application, known as the Municipal system, has given satisfactory results for street lighting in Portland, Maine, and elsewhere.

Respectfully,
Hermann Lemp.

Buffalo, Nov. 26th, 1886.

Editors Electrical Review :

Your readers know the Rochester telephone subscribers have rebelled. On the 20th instant, at high noon, with loud-sounding whistles and bells, the war-cry was proclaimed. Every telephone was silenced. A self-imposed infliction was announced.

To-day the telephone subscribers are pointing to the exchange in derision, saying, What use is this system to us? Revenge! we must have revenge! To carry out this scheme a "make and break" telephone has been given a trial, and steps have been taken toward organizing a company. The patentees are not willing to sell Rochester alone, but desire to organize a company for the whole of the United States. One of the papers commenting on the scheme pronounces it a great undertaking. That Rochester may be the home of a rival to the Bell Company that will be a credit to her.

A daily bulletin of the condition of things is published somewhat of this wise :

"No apparent weakening on the part of the subscribers or the company." Thus they brace one another up in their self-imposed conflict. We shall see what we shall see.

I saw a few days ago the large Brush dynamo built for the Cowles Aluminum Company at Lockport. Its output is 310 horse-power. The company are to add two more machines as soon as they can be had.

The Lockport Gas Compny are supplying the electric light also, both Brush and Edison. They are using the municipal system for street lighting, and I was informed by the management, it is economical and very satisfactory. The present system consists of 30 arc and 400 incandescent lights. The company provide either gas or electric light at the same price. Since competition is gone the growth of the electric system has ceased. I think it safe to say that if competition in lighting was established twice as many electric lights would be used. A sad comment on the policy of the gas company.

Apropos of dynamos, it is surprising how little knowledge the average citizen has of such machinery. A few days ago it was heralded abroad that an Owego man had by utilizing the now unused portion of the Gramme ring obtained such economy that twice the amount of light could be obtained by the same expenditure of horse-power, that was before possible. In other words one horse-power is equal to two. The public take it all in, intelligent men too. Useless to tell them such a feat would be contrary to the laws of the conservation of energy. Owegans admire the man immensely. He was one of those studious men who walked the streets in an ill-fitting shabby dress (with bowed head) carrying his thoughts with him. When now he returns in neat apparel and a silk hat, "see the conquering hero come." Such is life. H.

Contrivances to be Used in the Production of "Mephisto."

A stage surprise is in process of materialization on the boards of Tony Pastor's new Fourteenth Street Theater, such as has never been witnessed in New York. H. F. Juleene has brought to this country an electrical novelty of the most singular character. It consists in a system of voltaic batteries, located behind the stage, which are connected by twenty-nine miles of wire with various musical and automatic contrivances, suspended in all parts of the building. At one corner of the stage is placed a piano, which is at the same time an organ and harmonium.

As the play opens, an enchantress appears and seats herself at the instrument. Its various pedals and stops open and close circuits from the battery, by which hundreds of mysterious effects are produced throughout the building from one keyboard. Brass drums, Turkish cymbals, castanets, tambourines, triangles, torpedoes, silver bells and other instruments are played. Thunder, rain and hail storms are developed, wind and water-mills are set in motion, mocking birds and cuckoos sing, and an electric clock and illuminated railway appear, while a balloon ascent is also witnessed—in all twenty-eight different features appear within the twenty minutes that melodies are being played at the magic piano.

This strange electric combination has been operated in Paris, Vienna and London, but has not been exhibited before in this country. Mr. Juleene has been many years in perfecting it. The appearance of the theater with so many instruments and contrivances hung in all parts of it is strongly suggestive of a spiritual seance, and when the whole scheme is in full operation, with birds singing, cannons booming, bells chiming, railway trains in motion and balloons ascending, it suggests visions ranging from Fourth of July to pandemonium.

These novelties are to be presented next Monday in the new play "Mephisto," of which they are a feature. Harry Sanderson is confident that he has hit upon the biggest thing out, and Mr. Juleene expects to introduce his electric wonders on many other stages throughout the country.

New Method for Determining the Time of Oscillation of a Magnet.

In a recent number of the *Annalen der Physik und Chemie* H. G. Hausemann describes a new arrangement for determining the periodic time of a suspended magnet. This method, which can be adopted for any similar purpose, consists of an ingenious application of photography for recording the differences of agreement in position between the magnet under observation, and a seconds pendulum. The magnet is provided with a mirror in the ordinary way, by reflection from which the divisions of a scale mounted before it can be read off in a telescope. A small mirror fixed to the pendulum and parallel with its plane of oscillation, reflects when at rest the beam of an electric light on to a prism, provided with a broad slit crossed by a narrow vertical bar; from the prism the light is reflected on the mirror of the magnet, from which, when near its neutral position, the barred slit is focused in a small photographic camera specially constructed for the purpose The slide of the latter is furnished with a micrometer screw, so that the plate can be moved through a known distance between any two exposures. The elongations can be read on the telescope in the usual way, and by measurement of the distance between the images on the negative, the number of oscillations of the magnet corresponding to a given number of those of the pendulum can be accurately determined, if the times of exposure are chosen when the pendulum and magnet are both near their positions of rest. This method naturally admits of extreme accuracy in the determination of the quantities sought for, besides reducing the time required.

Mr. Henry W. Pope, of 55 Broadway, New York, has just completed the construction of a large Thomson-Houston plant at Cohoes, N. Y. The steam plant consists of straight-line engines, steel boilers, and Jarvis setting, and the city light circuits are so arranged as to be run either by water or steam-power at a moment's notice.

The line construction is extra heavy, each pole being over six inches diameter at the top, and all are painted olive green, with top of pole, cross arm, and butt black, presenting a neat appearance.

Mr. Pope has also recently equipped a station at Morristown, N. J., and is now building one at Somerville, N. J. The latter is to be equipped with Westinghouse steam and electric system and Thomson-Houston arc.

DEATH OF COL. COLGATE.

FAMOUS FOR HIS LONG LITIGATION WITH THE WESTERN UNION TELEGRAPH COMPANY.

Col. Clinton Gilbert Colgate died on Thursday at his residence in this city. He came into prominence about ten years ago by his famous suit against the Western Union Telegraph Company for infringement of a patent for insulating telegraph and cable wires with hard rubber. The suit was brought on a patent obtained in 1867 by the late Dr. George B. Simpson, a surgeon in the United States army, who claimed to have made the invention in 1847, when he actually filed an application for a patent. For some reason Dr. Simpson did not secure a patent until 1867, and by that time the device had come into general use. An interest in his patent was bought by the late Col. Arthur M. Eastman, of Manchester, N. H., who was Col. Colgate's father-in-law. Col. Eastman died before he could obtain a settlement with the telegraph companies, and then Col. Colgate brought his suit on the Eastman interest, which descended to him by inheritance. After a long fight he obtained a substantial victory by having the patent declared valid by the lower court. The Western Union Company then offered to compromise with him for $100,000 for its own use of the device and a pro rata payment for its use by the other companies it had previously absorbed. The offer was accepted, and Col. Colgate also made compromises on the same basis with the other telegraph companies, and got in all between $160,000 and $200,000. He wanted a royalty of 1 per cent. per message from the Western Union Company, but that corporation flatly refused to give it and the matter was not pressed.

Col. Colgate was a native of this city, and was at the time of his death in his fifty-second year. He spent a part of his early life in Australia, and at the outbreak of the war was a purser on a steamer plying between this port and Charleston. He resigned his position, enlisted in the Fifteenth New York Volunteers and served creditably throughout the war, rising to the rank of Colonel. He leaves a widow and two children.

Induction Telegraphy on the L. V. R. R.

The wires for the Phelps system of induction telegraphy, which is soon to be put into service on the Lehigh Valley Railroad, have been laid from Easton to Amboy Junction, a distance of about 58 miles. The wires are ordinary telegraph wires, about one-sixteenth of an inch in diameter, and are insulated with a covering similar to that on electric light wires, so that the wires very much resemble those used in conveying electric light currents. The wires are placed under the head of the rail and are held in position by being passed between the fish plates and the rail. The apparatus will very shortly be put into practical service on the New Jersey division of the road, and then there will be constant communication between the moving trains and the telegraph offices along the line. Superintendent of Telegraphs J. W. Lattig said to a reporter that the wires will be laid on the Lehigh division as soon as the work in New Jersey is completed, which will be in the course of about a week.

A Pittsburgh dispatch says the Westinghouse Air Brake Company Wednesday sent to its stockholders checks for a cash dividend of 50 per cent. on the old capital stock of $600,000, so that $300,000 will be distributed among the fortunate owners of shares. Accompanying each check was a circular announcing a dividend of 400 per cent. in stock, in accordance with the recent action of the company in voting to increase its share capital from $600,000 to $3,000,000 in order the more nearly to represent the value of the plant and property.

—— The Bridgeport Electric Light Company, Bridgeport, Conn., have received the fourth Armington & Sims Co. engine.

Telephonic Conversation as Evidence.

In another item we referred to the question of the admission of a telephonic conversation as evidence in a court of law as reported to have been ruled upon by Judge Barclay at St. Louis In the case of the Globe Printing Company *vs.* Stahl, on motion for a new trial, the Judge said :

"At the trial it was proven that one of the plaintiff's agents had a conversation concerning the matter in controversy here with defendant personally through the telephone in the usual manner. This witness testified that he recognized defendant's voice, which he knew, and as to the admissibility of that conversation defendant had raised no objection. The difficulty relates to the testimony of another witness, who stated that he didn't know defendant's voice or those of his clerks, and who was brought into communication with defendant solely through the telephone. He stated that he 'rang up' the defendant's number on the telephone list, and, after being duly connected by the central office, he asked : 'Is this Stahl ?' (the defendant). The answer was 'yes.' He then had some conversation with the answering party, which defendant urgently objected to as incompetent, on the ground that there was no satisfactory evidence of identity of the party answering. At the trial the Court admitted the evidence, and on this motion for a new trial the Court has been asked to review the ruling and has done so with some care.

"The courts of justice cannot and do not desire to ignore the great changes in modes of intercommunication which the introduction of the telegraph and telephone have accomplished. It is certainly the duty of courts to take judicial notice of such facts of general scientific knowledge as are part of public contemporary history. The nature, operation and ordinary uses of the telephone are such facts, and the courts should accordingly take such notice of them. When a person places himself in connection with the telephone system by having a telephone in his business office, he thereby invites communication in relation to his business through that medium. Such conversations, so held, are as admissible as personal conversations by a business customer with an unknown clerk in charge of an ordinary business office would be. The fact that the voice at defendant's telephone was not identified as that of defendant or any of his clerks, does not render the communication inadmissible.

"The ruling here announced is intended to relate merely to the question of admissibility in evidence of such conversations in such circumstauces, but not to determine the effect of such evidence after it is admitted."

Almost Asphyxiated by Coal Gas.

MARLBORO', Nov. 18, 1886. Charles Lawrence, conductor on the Marlboro' branch of the Fitchburg road, and his wife and sister-in-law were nearly asphyxiated by coal gas this morning. Mr. Lawrence awoke and experienced a peculiar sensation, started to get up, but fell to the floor. His wife endeavored to assist him, but was rendered unconscious, as was her sister when endeavoring to aid the others. Mr. Lawrence finally managed to get word to a neighboring family, a physician was called, and the sufferers were soon out of danger.—*Boston Herald.* [Gas papers please copy.]

Consolidation of the United States Incandescent Electric Light Company and the St. Paul Gas Light Company.

The St. Paul Gas Light Company takes pleasure in announcing to its patrons that it has secured the exclusive rights to use the United States system of incandescent lighting for St. Paul, and will be prepared within ten days to supply 16, 20, 50 or 100 candle-power lamps to such of its consumers as desire the incandescent ligh'.

E. I. FROST,
Secretary and Treasurer.

—— The Mobile *Telegram* complains that the city has no water and no electric lights.

The Cambridge Electric Light Company Celebrates.

The Cambridge Electric Light Company entertained last evening, at its building on Main street, Cambridge, about 300 prominent gentlemen of the city and vicinity, including the Mayor and various city officials. The upper floor of the large building in which the company's plant is located was turned into a dining hall to accommodate the company, and lighted for the occasion with 120 electric lights. Previous to the festivities an occasion was given the guests to inspect the premises and witness the lighting of the city by Mayor Russell. At the banquet Superintendent E. H. Mulliken presided. Prayer was offered by Rev. W. S. Apsey, D. D. After-dinner speeches were made by his Honor Mayor Russell; President Corcoran, of the Common Council ; Prof. A. E Dolbeare, of Tufts College; Judge Henry J. Wells, Hon. Charles Theodore Russell, Judge Wm. H. Orcutt, Superintendent of Streets McSorley, Aldermen Close and Kelley, Edgar R. Champlin, Esq., and Col. A. C. Wellington Pleasure was added to the occasion by vocal duets by City Messenger F. L. Pratt and Mr. J. H. Burgess, and a solo by Alderman Close. —*Boston Journal.*

The Electric Club Headquarters.

The club rooms of the Electric Club, at the Hotel Dam, New York, are now lighted by incandescent lamps, the U. S. Illuminating Company furnishing the installation. The large and handsome electroliers are much admired, and light is, of course, just what an Electric Club should have—although disproving the old theory that shoemakers' children go barefoot, and that gas companies use kerosene.

—— The Woonsocket Electric Machine and Power Company are putting in a new 140 horse-power boiler to increase their facilities.

—— A building that will cost $200,000 and known as the "Westinghouse Building," is to be erected at the corner of Ninth street and Penn avenue, Philadelphia. The lot cost $78 000. Electric light offices, the Westinghouse air brake offices, etc., will be in the building.

—— The St. Paul Gas Light Company announce that it has secured the exclusive right to use the United States system of incandescent lighting for St. Paul, and will be prepared within ten days to supply 16, 20, 50 or 100 candle-power lamps to such of its consumers as desire the incandescent light.

—— The United States Incandescent Light Company have just placed in the stores of Barnes, Henger & Co., of Buffalo, 120 of their incandescent lights for the first, second, and third stories and the basement of the great iron block. They are the first mercantile firm in the city to introduce this method of illumination into their store. They will continue to use it as an experiment until January 1st, and should it work to satisfaction they will introduce it throughout the entire building. Thus far it has worked nicely. Each light is of 16 candle-power and produces a brilliant effect. It gives forth a soft, beautiful light—in marked contrast with the flickering of gas light which so often interferes with the distinguishing of colors with exactness. The turning on and off of the lights is controlled on the first floor by means of switches, each switch governing five lights. Barnes, Henger & Co. are to be commended for their enterprise.

—— The calcium light, which has done so much for stage representations in the past, is doomed. As the old gas light has been superseded by the electric light, so also must the lime light give way before it. Every known shade in stage lighting can now be produced by electricity. We can get a warm yellow glow, a deep canary shade, a white light, a pale blue effect, a weird greenish tint, or a bright and effulgent red light, to say nothing of a soft, continuous non-dazzling illuminating flame. Chemistry and other sciences have also contributed much toward realism on the stage.

ELECTRIC LIGHT NEWS

—— The Buffalo council again order additional electric lights from the Brush Company of that city.

—— By order of the German Admiralty, Krupp is employing an expert instantaneous photographer to record the flight of projectiles, record of carriages, penetration of armor plates, etc.

—— One J. J. Black has sued the California Electric Light Company, of San Francisco, for $25,000 damages, claiming that he was partially paralyzed by an electric shock, received while in the employ of the company.

—— The Putnam (Ct.) Electric Light Company has been organized, with a capital stock of $12,000, and the Torrington (Conn.) Electric Company, with a capital of $12,000. The Norwalk Company has been organized, with a capital of $50,000.

—— At Fair Haven, Conn., since the electric light poles have been put up, more than half the property owners of Fair Haven have been going around with petitions to be signed by taxpayers and non taxpayers asking for the new-style lights to be erected in front of their premises. The councilmen are made very tired by the clamoring of their constituents.

—— An Edison Electric Light Company is to be formed, it is said, in the city of Philadelphia with $1000,000 capital. The chief object of the company is to operate the incandescent system, but preparations are to be made to furnish heat and power also. The intention is to have a series of plants throughout the city, each commanding a section eight blocks square. At first but two plants will be erected, at a cost of $400,000 each. The following are the incorporators : Amos R. Little, B K. Jamison, Charles M. Swain, S. B. Huey, and Henry M. Dechert.

—— The Philadelphia Traction Company, although well satisfied with its cable system, is looking into the question of electricity as a motor. Vice President Widener said : "It is true that we propose to experiment with a new motor. The only question remaining is as to the cost of maintenance of the cars and the furnishing of the motive power. We will put the first car on the Chestnut street line, and if the experiment justifies the change we will, of course, adopt the new motor for that line, and probably for others of our system."

—— "The method of lighting ships of war with electricity," says Commodore J. G. Walker, of the Bureau of Navigation, in his annual report, "owing to the small amount of heat given off and the absence of disagreeable odors, and the more perfect illumination, adds much to the health and comfort of the officers and men and tends to make them contented and happy during their long absences from home and friends, promotes discipline, and prevents crime." The ships are to be furnished hereafter with photographic outfits, and the official reports will be illustrated.

—— The Edison Electric Light Company, of Philadelphia, has filed articles of incorporation. The incorporators are Amos R. Little, B K. Jamison, Charles M. Swain, S. B. Huey and Henry M. Dechert. The capital is $1,000,000, and it is said operations on the plant will begin in about thirty days. A contract will be made with the principal Edison company in New York, after which permission will be asked of Councils to lay the wires. The company proposes to furnish heat, light and power, operating the incandescent system. The intention is to have the city divided into districts, with a plant in each district.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING NOV. 23, 1886.

352,900 Telephone transmitter; Malone Wheless and James D. Darden, Washington, D. C., said Wheless assignor to said Darden.

352,903 Electro-mechanical signal apparatus; William W. Le Grande, Louisville, Ky., assignor of one-half to H. R. Dering, W. W. Dering and T. H. Upperman, all of same place, and George E. Rockwell, Indianapolis, Ind.

352,948 Individual call apparatus; Lycurgus S. Glover, Marion, Kan.

352,990 Automatic electrical signal coupler; John S. Copers, New Orleans, La.

353,003 Electric motor for sewing machines; Ernest Recordon, Paris, France.

353,035 Mode of connecting and disconnecting generators for electric lighting; John W. Howell, New Brunswick, assignor to himself and Francis R. Upton, Orange, N. J.

353,120 Insulator; Robert G. Brown, Brooklyn, N. Y., assignor to E. S. Greeley & Co., New York, N. Y.

353,123 Electric elevator; John H. Clark, Boston, Mass.

353,128 Multiple telegraphy; Stephen D. Field, Yonkers, N. Y.

353,142 Application of secondary batteries to electric lighting; Edward R. Knowles, Brooklyn, N. Y.

353,151 Dynamo electric machine; Richard H. Mather, Windsor, Ct.

353,158 Incandescent electric lamp; Albert L. Reinmann, Pittsburgh, Pa.

353,164 Brush holder for dynamo electric machines; Albert Schmid, Pittsburgh, Pa.

353,179 Regulator for electric currents; Elihu Thomson, Lynn, Mass.

353,180 Regulator for dynamo electric machines, motors, etc.; Elihu Thomson, Lynn, Mass.

353,184 Electric switchboard; Joseph H. Wehrle, Newark, N. J.

353,248 Electric lighting of railway trains; Chas. E. Buell, New Haven, Ct.

353,263 Electric door opener; Adam Lungen, New York, N. Y.

353,269 Window spring for electric burglar alarms; Theodore H. Parker and John Geary, Philadelphia, Pa., assignors to Shaw & Geary, same place.

353,273 Striker for electric bells; Charles A. Tucker, Islip, and William H. Markland, Brooklyn, N. Y., assignors, by mesne assignments, to said Charles A. Tucker.

353,274 Electric bell; Charles A. Tucker, Islip, and William H. Markland, Brooklyn, N. Y., assignors, by mesne assignments, to said Charles A. Tucker.

BUSINESS NOTICE.

Baker & Co., gold, silver and platinum refiners, assayers and smelters, 408, 410, 412 and 414 N. J. R.R. ave., Newark, N. J. Platinum for all purposes, any degree of hardness or size. Wholesale or retail. Native or scrap platinum, melted, refined or purchased.

Business wanted for a two-story factory, 75×35, well lighted, engine, gas, etc.; built to encourage some industry in the village of Mattapoisett, Plymouth Co., Mass. Apply to P. M.

FOR SALE CHEAP.
One 12 Light Brush Dynamo & Lamps.
One 6 Light Brush Dynamo & Lamps.
W. N. GRAY,
Carlisle Building, Cincinnati, Ohio.

NEW YORK & WASHINGTON ELECTRICAL PATENTS.
FOWLER & FOWLER.

A. C. FOWLER, C. E., Attorney at Law, EXAMINER IN U.S. PATENT OFFICE, 1880 to 1886, ELECTRICAL DIVISION. Office, Temple Court (Beekman and Nassau Streets), New York City.

CHAS. D. FOWLER, Counselor at Law. Office, Pacific Building (622-4 F Street, half block east Patent Office), Washington, D. C.

Investigations and Correspondence in FRENCH and GERMAN.

EDWARD P. THOMPSON, Solicitor of Electrical Patents, and Electrical Expert (two years Manager—successor to N. S. Keith—of the Pat. Agency of the *Electrical World* and Associate Editor), who *personally* prepared and prosecuted, while Manager, every case in caveats, patents, trade marks, etc., submitted to the Agency, has established, as sole proprietor, manager and attorney, a patent office. No risks. Deposits to be held by the Madison Square Bank, New York, till the client is satisfied with the work; otherwise refunded. From the Agency's circular, distributed just before my departure: "We could fill pages of similar unsolicited compliments. We might add that since these letters were received we have done additional patent business for nearly all the above, and that to our knowledge we have never lost a client." Write for personal testimonials and instructions, to E. P. THOMPSON, Temple Court, Beekman st., N.Y.

WANTED: A 20 Arc Light Dynamo, 20 or more Amperes, SECOND HAND, IN GOOD ORDER.
Address, with all particulars, and best figures,
C. B. Shedd, 85 Washington St., Chicago, Ill.

BUSINESS NOTICE.

THIS IS TO GIVE NOTICE, that on Saturday, October 30, 1886, I addressed to "J. Burke Hendry, International Agency, 446 Strand, London. E. C., England," a notice "to complete and close" whatever contract or extension thereof he, Hendry, had or pretended to have with William Mackintosh, of this city, relating to the use of certain inventions for "underground telegraph line or lines" in the cities of Brooklyn and New York; and in default of such notice reaching Hendry abroad, this is to give him notice, and also James Boys and S. S. Ely, his attorneys, and whoever may represent him or be his assigns, "to complete and close" said contract and its extension according to the terms thereof.

William Mackintosh is under disability as *non compos mentis*, but how long that has been his condition I cannot state.

JAMES W. BLACKWOOD,
Guardian of the Person and Estate of
William Mackintosh.

Providence, R. I., Nov. 17, 1886.

UNITED ELECTRIC COMPANY,
SALT LAKE CITY, UTAH, AND CHEYENNE, WYO.,
Dealers in Electrical Apparatus and Supplies.
We have special facilities for furnishing material and doing work in Utah, Wyoming, Idaho, Montana and Washington Territories at Eastern prices.
UNITED ELECTRIC COMPANY,
Post Office Box 277, SALT LAKE CITY, UTAH. | Post Office Box 574, CHEYENNE, WYOMING

BOWSHER'S TELL SPEED INDICATOR.
Especially adapted to Electric Light Machinery. Is absolutely reliable. Connects to machinery with small belt. Besides **continually** showing speed on dial, it **alarms** when speed runs "too fast" or "too slow." Dial, 12 inches diameter. Weight, 10 lbs. All orders must give the exact size and average speed of shaft to be connected with.
N. P. BOWSHER,
Sole Man'r, South Bend, Ind.

Detroit Electrical Works

MANUFACTURERS OF

ELECTRIC SUPPLIES,

INCLUDING

Medical Batteries, Skeleton and Box Bells, Burglar Alarms, House Annunciators, Fire Alarm Boxes, Pins, and Brackets,

INSULATED MAGNET, TELEPHONE AND ELECTRIC LIGHT WIRE.

GENERAL OFFICES and FACTORY:
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Special Tools and Dies. Model and Experimental Work a specialty.

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Fig.259

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Fig.255

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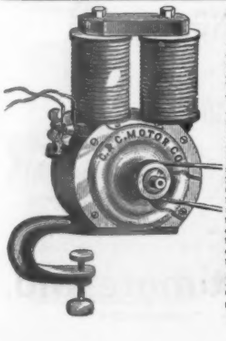

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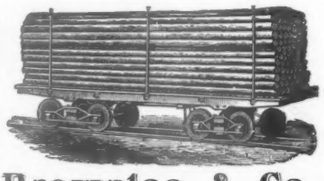

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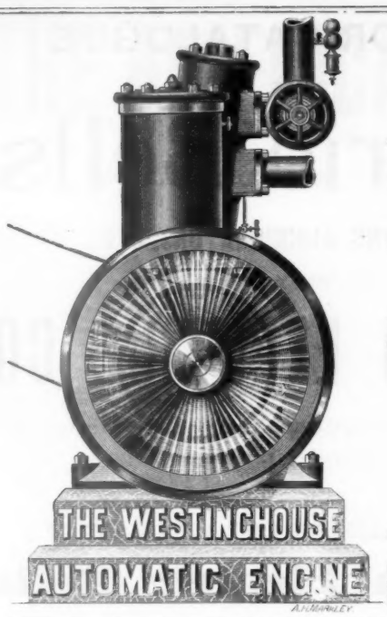

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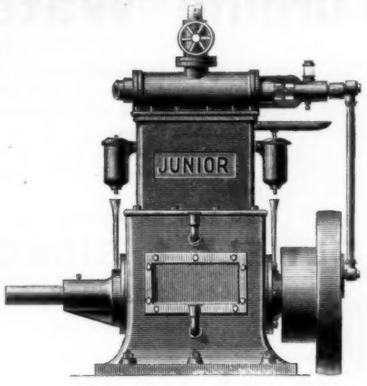

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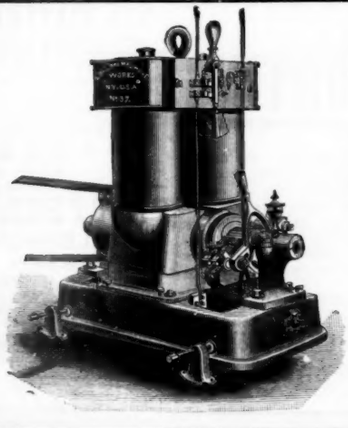

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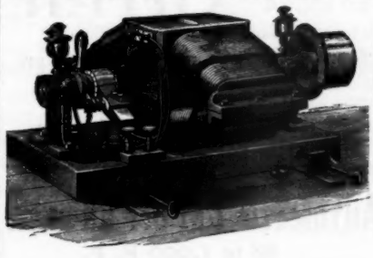

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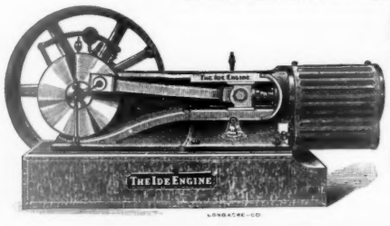

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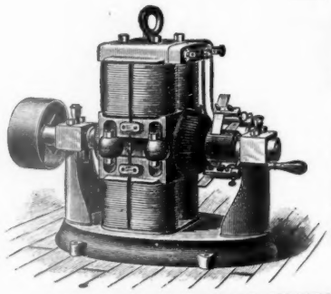

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Hartford, Conn.

THE AMERICAN SYSTEM OF ARC LIGHTING.

FOLLOWING IS A PARTIAL LIST OF APPARATUS SOLD SINCE FEBRUARY 1, 1886.

	Number of Lights Sold.
Carew Manufacturing Co., South Hadley Falls, Mass	10
Merchants Electric Light & Power Co., Boston, Mass	50
Ware, Pratt & Co., Worcester, Mass	15
Arlington Mill, Lawrence, Mass	300
Washington Mills Co., Lawrence, Mass	450
Citizens Electric Light Co., East Boston, Mass	75
American Illuminating Co., Old Orchard Beach, Me	35
American Illuminating Co., Hornellsville, N. Y.	125
Saratoga Electric Light Co., Saratoga, N. Y.	125
Poughkeepsie Electric Light Co., Poughkeepsie, N. Y	50
Jacksonville Gas Co., Jacksonville, Fla	50
St. Paul Gas Co., St. Paul, Minn	25
Badger Illuminating Co., Milwaukee, Wis	200
Badger Illuminating Co., Chicago, Ill	100
American Illuminating Co., Augusta, Ga	85
George A. Mayo, Friendship, N. Y	10
Electrical Development and Manufacturing Co., Boston, Mass	15
W. F. Hall, Kennebunk Beach, Me	10
Asbury Park Electric Light Co., Asbury Park, N. J	35
Bamford Bros., Paterson, N. J	35
Nov. 15, 1886.	

	Number of Lights Sold.
Fort William Henry Hotel, Lake George, N. Y.	6
Tudor Iron Works, St. Louis, Mo	25
Lord & Taylor, Grand Street, New York City	60
Manchester Locomotive Works, Manchester, N. H.	80
Le Roy Silk Co., Le Roy, N. Y.	35
American Illuminating Co., Oneida, N. Y.	50
Dr. T. V. Roe and associates, Tarrytown, N. Y.	35
Consolidated Electric Light Co., Portland, Me	25
P. T. Hallahan, Philadelphia, Pa	15
Brush Electric Light and Power Co., Nashville, Tenn.	50
H. M. the King of Corea	4
Brookline Gas Co., Brookline, Mass	300
Bridgeport Malleable Iron Co., Bridgeport, Conn	25
American Illuminating Co., Saco and Biddeford, Me	100
Edison Illuminating Co., York, Pa.	25
Edison Illuminating Co., Lawrence, Mass.	6
Seth W. Fuller & Holtzer, Boston, Mass.	10
	2,646

N. B.—We refer to our Customers as to the Efficiency and Character of our Apparatus.

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St. Paul Gas Co., St. Paul, Minn.—State of Minnesota.
Citizens Gas Light Co., Jacksonville, Fla.—State of Florida.
Sowdon, Eder & Wright, 131 Devonshire St., Boston.—New England States (except Connecticut.)
Pittsburgh Electric Company, Eugene Ingold, General Manager, 213 Wood St., Pittsburgh, Pa.—Western Pennsylvania, Ohio, Kentucky and West Virginia.
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Markle Engineering Company, Detroit, Mich.—State of Michigan.

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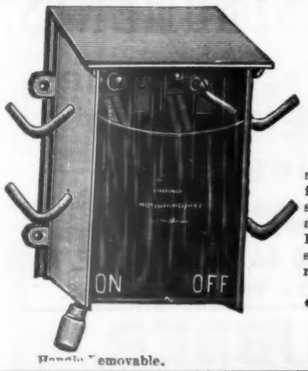

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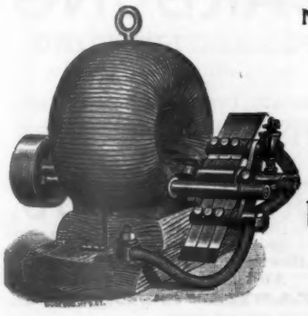

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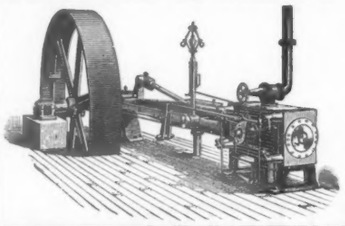

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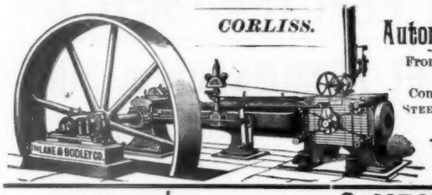

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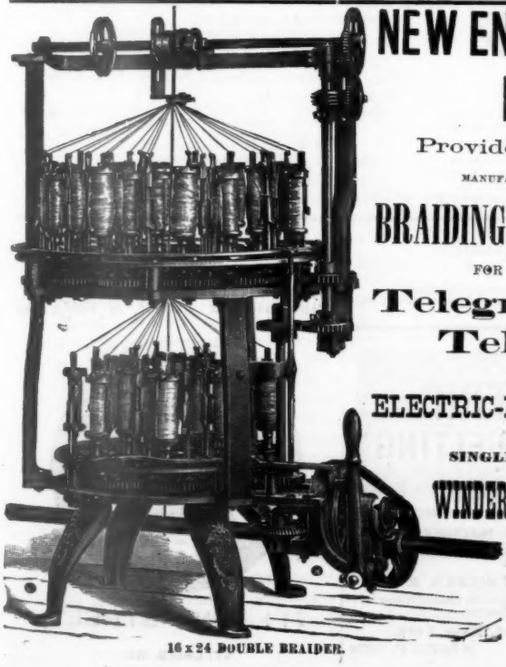

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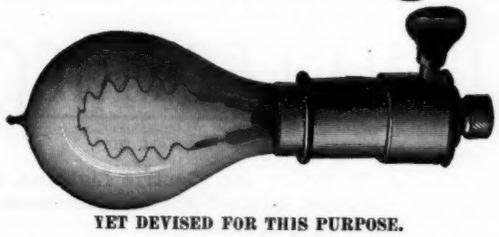

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